

The Iron Age

A Chilton Publication

How critical is
the manpower
shortage?
See page 55

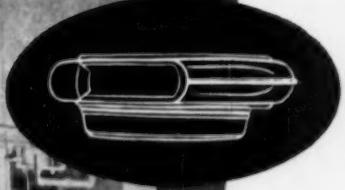
THE NATIONAL METALWORKING WEEKLY • DECEMBER 15, 1955

this

Verson^{TRADE MARK}

TRANSMAT PRESS

Verson



is producing **1000 automotive air cleaner shells**
per hour automatically

In another cost cutting production process engineered by Verson, this 900-ton, two-slide Transmat press completes 1000 air cleaner shells every hour without human handling. The intricate piece part is formed from coil stock in eight consecutive operations. This is the economical way to produce any part requiring four or more operations on 4000 or more pieces per day.

Verson^{TRADE MARK}

VERSON ALLSTEEL PRESS CO.

CHICAGO AND DALLAS



More Heat From Less Fuel

FOUNDRY SAVES \$32,040 IN ONE YEAR WITH WHITING-THERMO HOT BLAST SYSTEM!

Here is proof that the Whiting-Thermo Hot Blast System makes *big* savings! The following figures show dollar results obtained from an actual installation, accurately measured and controlled:

	BEFORE HOT BLAST	AFTER WHITING-THERMO HOT BLAST
Cost of metal charge	\$42.57 per net ton	\$42.43 per net ton
Coke	.45	.29
Flux	.67	.28
Gas fuel for blast preheater	(none)	.20
Misc. charges		.15
TOTAL	\$47.79	\$46.01
SAVINGS per net ton		\$1.78
SAVINGS (72 ton/250 days) per year		\$32,040.00



WRITE FOR REPORT
CONTAINING IMPORTANT INFORMATION
ON HOT BLAST.
Ask for Bulletin FO-3

The Whiting-Thermo Hot Blast System employs a separate fired air heater, precisely controls air blast temperatures up to 1000°F. and makes available almost instant pre-heated air. Large savings in coke, silicon and fluxing agents are provided. The lining does not burn out over nearly as high an area as with cold blast—thus patching costs are reduced about 50%. Melting rates can be increased 10% to 15%, using the same diameter lining. Analysis is more uniform—fewer casting rejects. There is a reduction in oxidation of silicon and less sulphur pick up.

Send for complete information on Whiting-Thermo Hot Blast Systems today!

WHITING CORPORATION

15601 Lathrop Avenue, Harvey, Illinois





Hay baler by New Holland Machine Co., New Holland, Pa.



Now the haystack is as hard to find as the needle

No more do you find huge dome-shaped stacks dotting the hay-fields of the countryside. Instead, tight and easy-to-handle bales are neatly formed and tied by efficient hay balers such as this one.

Hay balers, like other labor-saving agricultural machinery, have enormously increased in number in the decade since World War II. And because steel sheets are vital in the making of this type of heavy equipment, farm machinery has taken a rapidly swelling share of Bethlehem's hot- and cold-rolled sheet output.

Agriculture, in turn, is just one of many lines which have grown into big consumers of Bethlehem sheets in the past few years. Add them all up, together with continuing requirements of longer-established sheet users, and it's easy to see why Bethlehem is being called on to manufacture sheets in larger volume than ever before. We are making every effort to catch up to the unprecedented demand.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM SHEETS



Vol. 176, No. 29 December 12, 1952

Starred items are digested at the right

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Philadelphia 39, Pa.

NEWS DEVELOPMENTS

HOW SERIOUS IS THE SKILLED WORKER SNAG?—P. 55
Industry's need for top-flight craftsmen is nearing the barrel-scraping stage. Key metalworking areas find there's a critical shortage of all types of first class labor talent. Machinery producers, automotive, foundries, and aircraft are among hardest hit. The problem is long-range, requires lots of careful planning now on your part.

VACUUM MELTING STRETCHES ITS LEGS — P. 57
New 2200-lb furnace opens up new applications for high-purity steel and alloys. Industry foresees further expansion. Cost factor expected to be offset by superior qualities of vacuum-melted materials.

USE OF SALT BATH QUENCH GAINS GROUND—P. 58
Trend is still small, but salt bath quenches for heat treated steel are gaining ground. One farm implement maker will advertise long wearing gear resulting from process. Growth of process for production run parts is new, but significant. Most applications are among captive shops, but jobbers are adding to their salt quench capacity.

PROBERS SHELF AUTOMATION CURBS FOR NOW—P. 62
A congressional subcommittee says no laws are needed right now to control automation. Booming employment has reduced the problems of current job swing. But slump could bring on legislative action. Lawmakers will continue to study the matter, call on unions and management to work for smooth transition.

RADIOACTIVE ISOTOPES MEAN BETTER BOND — P. 63
The addition of radioactive lime to the lime lubricants used in drawing steel wire makes it possible to check the wire for complete removal of the unwanted coatings. This will probably lead to better cleaning methods and promote better bonding of the wire to the commercially used coatings.

HOW HIGH CAN HORSE POWER RACE GO?—P. 72
Engine designers have to bear the brunt of salesmen who use hp as major selling point. Race for power has been costly to some automakers who didn't plan for today's power demands. Gas turbines are still in the future. Fuel injection systems may be next development, particularly if hoods are lowered.

ENGINEERING & PRODUCTION

PUNCHED CARDS CONTROL PARTS SCHEDULING—P. 95
Keeping track of in-process parts is a simple and fool-proof matter with this tabulating card system. Paper work in ordering and scheduling of parts is cut in half. Punched cards carry all necessary production information. No multiple copies are needed. System is best used where design is relatively simple.

PLANER MILLS INTRICATE 1-TON CASTINGS—P. 98
Castings weighing 1900 lb and more are rough and finish machined in a multiple series of operations on one specially built machine. Two coordinated horizontal milling heads work with two vertical heads to minimize production costs. Twenty-two inch diam cutters simultaneously face more than 3 sq ft of casting surface. High-strength casting later houses heavy-duty gear trains used for driving excavator cranes.

SPEEDY UNIT PERFORMS 3-WAY INSPECTION—P. 100
Continuous magnetic analysis of non-magnetic or paramagnetic materials now appears feasible at speeds in excess of 500 fpm. Flaws 0.004 in. in diam already are being spotted at 250 fpm in 16-gage stainless tubing. Tubing and bar stock are 100 pct inspected for chemical composition, presence of defects and dimensions, including wall thickness, ID and OD of tubing.

ROLLING, FORGE FACILITIES ARE VERSATILE—P. 103
A metals pilot plant charged with developing better metallurgical products and processes can't know what it may be called upon for tomorrow, next month, next year. One answer lies in choosing adaptable, multi-purpose equipment. Here's how facilities at Westinghouse's new Blairsville Metals Plant were fitted to this philosophy.

DEVICE IMPROVES PYROMETER OPERATION—P. 108
The best pyrometric instruments are no better than their sensing elements. Sharon Steel Corp. improved its annealing practice, with equipment for detecting, temporarily repairing common thermocouple faults.

NEXT WEEK:

ALLOY PLATING CAN GIVE PRODUCTS NEW APPEAL
Co-deposition of metals has intrigued platers for a long time but it's been only recently that major roadblocks to commercial application were removed. Now, several alloys can be deposited, giving unique properties not obtainable by plating with single metals. Sales appeal, quality of product can be upgraded.

MARKETS & PRICES

TIN SITUATION BECOMING UNPREDICTABLE—P. 60
The situation on the world tin market is beginning to revert to form—fluctuating and unpredictable. Since the turn of the century supply and demand have played leap frog—a total of 15 times. Current outlook is for demand to exceed supply for the 16th time in the near future. Tin Agreement offers some hope of stability.

COPPER PREDICTS 3 MILLION TONS IN '56—P. 158
Consensus of opinion in the copper industry is that world production of refined copper in 1956 will be in the neighborhood of 3 million tons—barring strikes or unforeseen developments. Industry is saying this with fingers crossed because the shutdowns in Chile and U. S. in 1955, which prevented 3 million ton production, may very well reoccur in 1956.

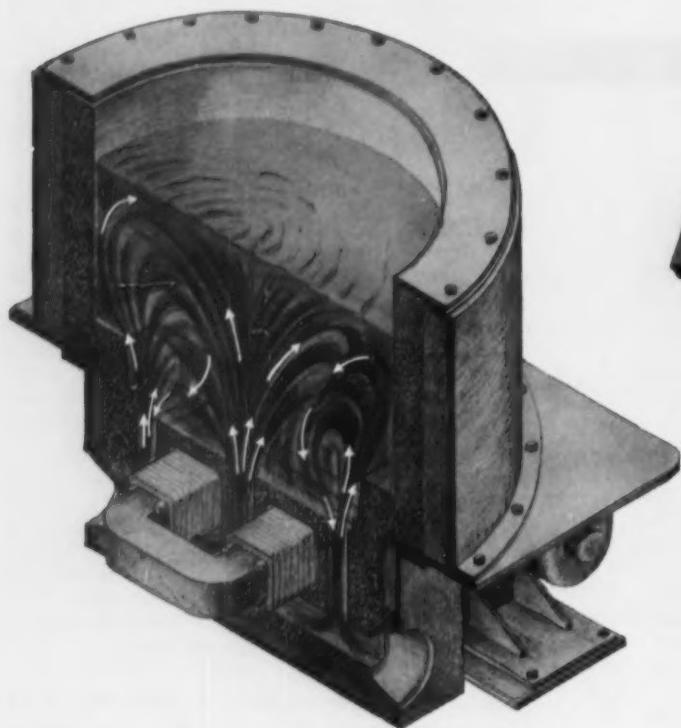
FOREIGN TRADE WORRIES MACHINE TOOL MEN—P. 83
Machine tool exports are down. Imports have dropped too but eased tariffs may strengthen the position of foreign competition here. Government's new yardstick for foreign procurement could also cut into domestic builders' markets. Spokesmen call tool capacity vital to defense, will fight any tariff drop. Stiff trade barriers of other nations are cited.

COKE PINCH MAY AFFECT STEEL OUTPUT—P. 59
Starting up of expensive beehive ovens points up what everybody knows. Coke is tight. Expansion of by-product coke capacity has lagged while blast furnace operations continue at a high level. Situation has made for booming demands on merchant coke oven plants.

UNHAPPY HOLIDAYS FOR STEEL CONSUMERS—P. 151
Steel supply outlook continues bleak. Industry is straining to increase output, but maintenance and holiday letdown are defeating producer efforts. Pressure on mills from railroads compounds problem of meeting overall demand. Backlogs still mounting.

WILL COPPER EVER SHAKE OFF SHORTAGE WOES?
Copper is tight now. How is this condition affecting the industry's market position? How long will it continue? Next week Tom Campbell goes into these questions, covering the immediate and long-range outlooks for the red metal. His predictions may surprise you. All his facts will be of interest and value.

The Furnace that Stirs Itself!



TWIN COIL INDUCTORS

Lead Non-Ferrous Melting

The sectional view above shows the twin coil stirring action of the 100 kW Ajax-Tama Wyatt 60 cycle induction furnace. Heat induced in the secondary channels below is conveyed throughout the melt by electromagnetic circulation as shown by the arrows. The 100 kW furnace shown here is one of a family of twin coil furnaces available today for melting rates from 300 to 10,000 lbs. per hour.

**ELECTROMAGNETIC PRESSURE
CIRCULATES MOLTEN METAL**

— In this 60 Cycle —

AJAX TAMA-WYATT
Induction Furnace —

Heat is generated only in the melting channels. Controlled stirring (*neither too much nor too little*) guarantees uniformity of metal temperature and alloy composition and also leads to efficient melting of light scrap. Tiresome puddling is eliminated. The metal is held entirely in an inert refractory lining. The atmosphere is cool and free from contaminating gases.

**No Other Method
Enables such Completely**

CONTROLLED MELTING

Today, AJAX builds a complete line of these time-tested furnaces in standard sizes up to 333 kW for the dependable melting of aluminum, brass, copper and zinc. Units for special applications are carefully engineered to specifications.



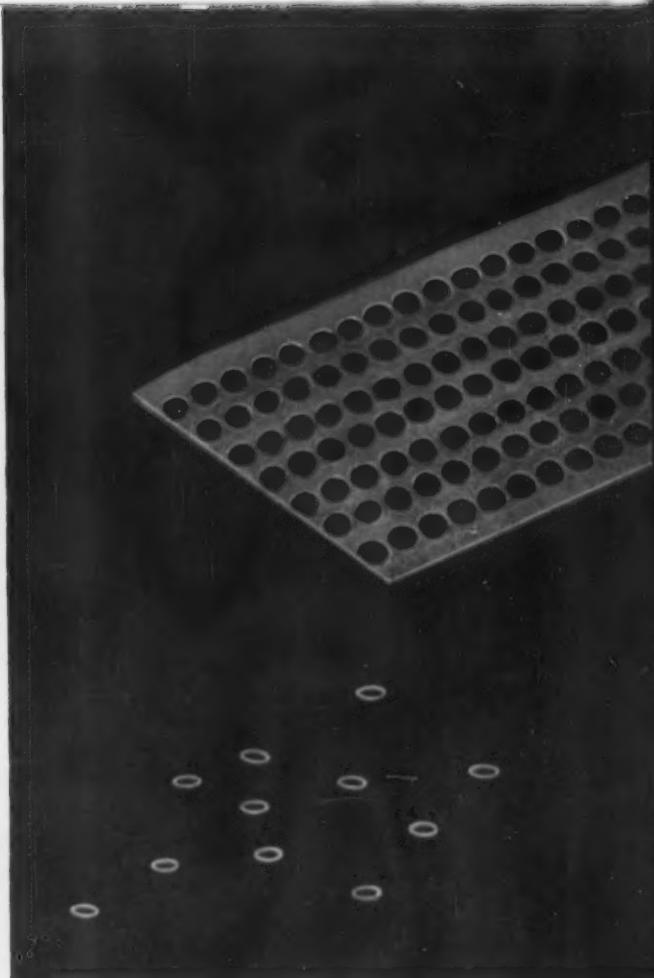
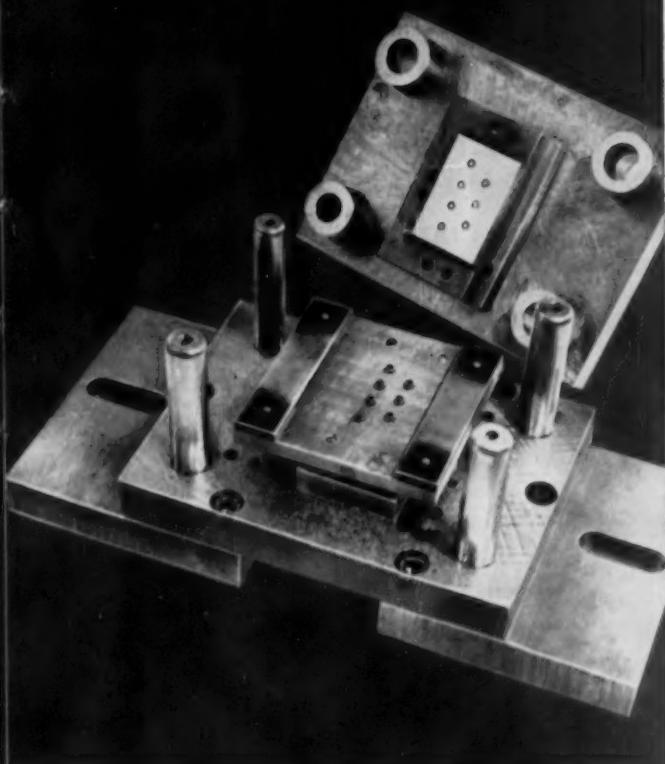
For Further Information, Send For Bulletin R-43

AJAX TAMA-WYATT **AJAX ENGINEERING CORP., TRENTON 7, N. J.**
INDUCTION MELTING FURNACE



AJAX ELECTRO METALLURGICAL CORP., and Associated Companies
AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
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AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting

FIELD REPORT: NO. 87



WHICH DIE STEEL WOULD YOU USE HERE to boost production per grind 500%?

These tools blank out dead soft brass washers, .170" O.D. x .100" I.D., .009" thick, on a punch press at 186 strokes per minute. It is an exacting job for a couple of reasons. First, it involves a government contract and strict delivery schedules have to be maintained. Then too, the punch and die are set up to blank seven washers per stroke and have to do this for many millions of pieces . . . and still remain within burr limitations set up by the government. Performance from the steel used in the past was far from satisfactory . . . to maintain schedules, production had to be substantially increased.

Suppose the decision were up to you. Which die steel would you be willing to recommend for steady, trouble-free production?

In this Field Report from customer files, here's what happened: The Carpenter Matched Set Diagram was consulted and Carpenter No. 610 (Air-Wear) was selected. Since then No. 610 has enabled the Company to hold delivery schedules comfortably . . . racking up increases in production per grind as high as 500%. And this is especially significant when you realize that five

hours' downtime is involved each time the tools have to be reground. Total parts to date: 5,500,000 . . . and the tool is still good for about 15 regrinds of .003" each.

Why make the tough decisions alone, when Carpenter's service organization is sincerely interested and equipped to work with you? A move in the right direction would be to call your nearest Carpenter Mill-Branch Warehouse, Office, or Distributor, now. The Carpenter Steel Co., 121 W. Bern St., Reading, Pa.

Your toolroom can use Carpenter Matched Tool and Die Steels to:



Reduce hardening hazards

Minimize machine downtime

Boost output per grind

Improve product quality

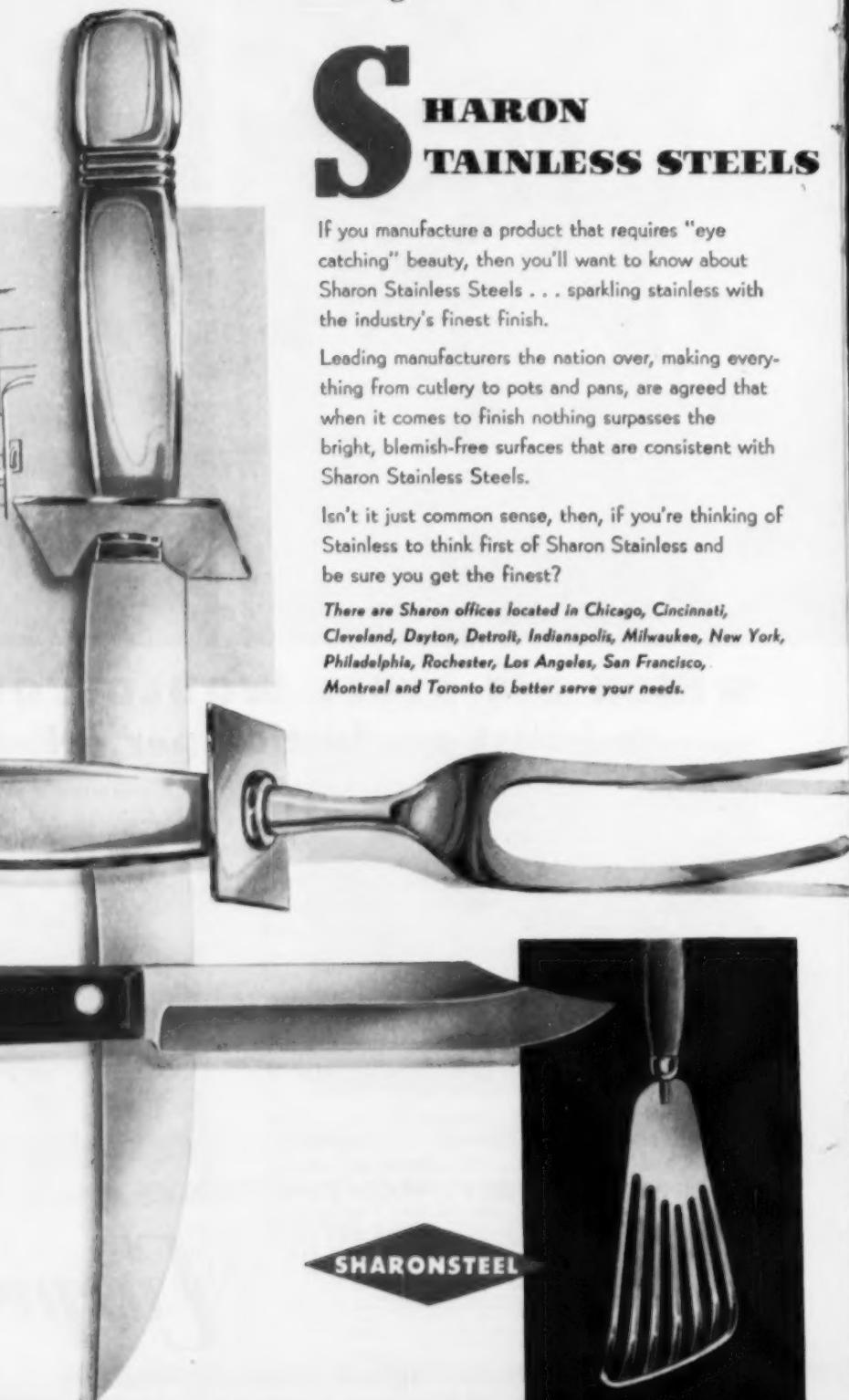
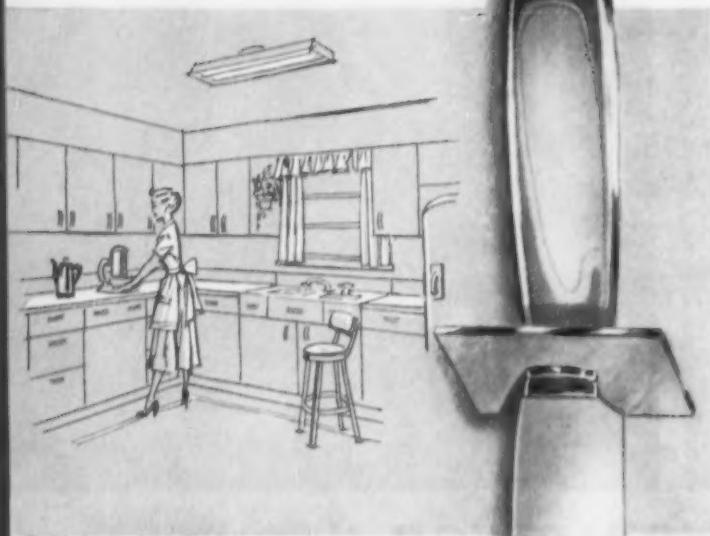
Carpenter STEEL

Matched Tool and Die Steels



IMMEDIATE DELIVERY from local warehouse stocks—Export Address: Port Washington, N. Y.—"CARSTEELCO"

Stainless with the better finish is ...



SHARON **TAINLESS STEELS**

If you manufacture a product that requires "eye catching" beauty, then you'll want to know about Sharon Stainless Steels . . . sparkling stainless with the industry's finest finish.

Leading manufacturers the nation over, making everything from cutlery to pots and pans, are agreed that when it comes to finish nothing surpasses the bright, blemish-free surfaces that are consistent with Sharon Stainless Steels.

Isn't it just common sense, then, if you're thinking of Stainless to think first of Sharon Stainless and be sure you get the finest?

There are Sharon offices located in Chicago, Cincinnati, Cleveland, Dayton, Detroit, Indianapolis, Milwaukee, New York, Philadelphia, Rochester, Los Angeles, San Francisco, Montreal and Toronto to better serve your needs.

Get the 430 Story

Sharon has prepared a fact-packed, fully illustrated booklet with up-to-the-minute information about 430 Stainless Steel. To get your free copy contact your nearest Sharon representative or write direct.



SHARON STEEL CORPORATION *Sharon, Pennsylvania*

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Indexed in the Industrial Arts Index

and the Engineering Index.



Editorial:

Wishful Inventory Thinking

♦ FOR MONTHS ON END you probably have had it drummed into your ears that inventories are on their way up. You may have been too busy trying to get metals, motors and other materials to figure what "up" means. It doesn't mean what it says—you can be sure.

Government studies show that sales and orders have risen at a faster pace than inventories. These reports also point out that higher prices have obscured the fact that inventory increases are not all physical gains.

But by the time such studies show that relatively inventories are declining, the situation has become more pronounced. Official figures are always one to two months late. Perhaps in another four months or so we will have additional studies showing what we ought to know this week: inventories are going down; they are not going up.

This is the time to take a good look at those shelves of yours. We suspect you won't find much steel, aluminum, copper or motors on them. We also believe that at present you are having much more trouble obtaining major materials than you had during the period covered in official inventory studies.

Yet there are people within your own organization who now tell you things will be easier in another three to six months. The theory here is that what you don't have today you can get tomorrow. Can you afford to take that chance?

The steel industry is on its way with the biggest peacetime expansion in its history. It will need motors, steel, copper, machinery, electronic equipment and hundreds of other items. Much of this will mean "steel for steel expansion"—not steel for you. The faster the steel expansion program picks up the less steel you get. That is the only way to make sure you get more steel later.

But the steel industry is only one of many sections of the economy which is expanding. Nineteen fifty-six will go down as one of the greatest—if not the greatest—peacetime expansion years.

If you have been too busy to notice what is going on, here is a partial list of industries which are expanding at a terrific rate: steel, aluminum, copper, railroads, paper, oil and gas and aircraft.

You can assume that those who serve these industries will expand also. They must if they are to fill orders promptly—and be in a position to service industry at higher levels of production.

Tom Campbell
EDITOR-IN-CHIEF

THE

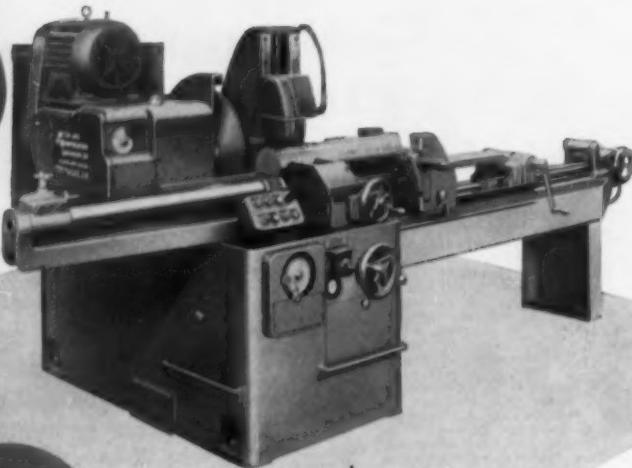


IS A Triple-threat TO HIGH CUTTING COSTS

CIRCULAR
SAWING
MACHINES

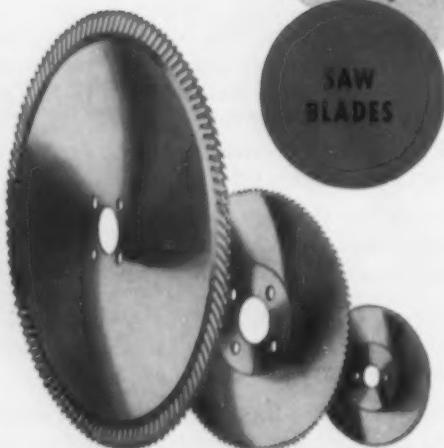


SAW
BLADE
SHARPENERS



The No. 2-8 machine for cutting off solid metal up to 8' square.

The G-45 sharpener for blades 8' through 48' diameter.



M. & M. saw blades cut any machinable metal. Cut-off blades: segmental — 11" through 120" diameter; solid — 8" through 20" diameter. Slitting saws — 3" through 8" diameter.

You may profit immensely by applying the M. & M. Triple Threat to your cut-off costs. Machine, blade, and grinder, made by the first company to build all 3, often effect phenomenal savings, as proved by detailed case studies. Just such a study of your job is yours for the asking. We offer you an unmatched experience in the sawing of any machinable metal, round, square or structural shapes, from 1/4" through 43" diameter.

THE
**MOTCH & MERRYWEATHER
MACHINERY CO.**

MACHINERY MANUFACTURING DIVISION

CLEVELAND 13, OHIO

Builders also of Production Milling, Vertical Turning, Automatic and Special Machines

dear editor:

letters from readers

Industrial Medicine

Sir:

My attention has just been drawn to an article entitled "Medical: Is Your Setup Adequate?" which appeared in the October 13th issue.

In particular I am concerned with a statement in this article to the effect that the Occupational Health Institute "is the official association of all doctors concerned with medicine as applied to industry." I feel that I should call your attention to the fact that this statement just simply is not true. I speak for the American Academy of Occupational Medicine which has been in existence for ten years and which includes in its membership approximately 200 physicians who devote full-time to medicine as applied to industry. Included in the membership of the American Academy of Occupational Medicine are the medical directors of some of the largest corporations in the nation, many leaders in the field of education of doctors for the practice of industrial medicine and the directors of important governmental units concerned with industrial health.

At the last meeting of the Board of Directors of the American Academy of Occupational Medicine, held on October 17, 1955, the Board specifically and unanimously voted to avoid any relationship with the Occupational Health Institute. *Leonard J. Goldwater, M.D., Secretary, American Academy of Occupational Medicine, New York.*

The statement to which Dr. Goldwater objects was drawn almost verbatim from literature of the Occupational Health Institute, an adjunct of the Industrial Medical Assn. We plead guilty to what the semanticists refer to as the sin of "alleging."—Ed.

New Casting Machine

Sir:

On the "Newsfront" page of your November 24th issue you have

a paragraph titled "New Casting Machine Cuts Part Costs."

We would appreciate your giving us the name of the manufacturer so we can obtain further information. *A. J. Wayson, Vice President, Merriman Bros., Inc., 185 Amory St., Boston.*

Further information may be obtained from the Rapids-Cast Corp., Grand Rapids 4, Michigan.—Ed.

High Speed Pipe Welding

Sir:

There is an interesting item in your November 24th issue under "Newsfront" entitled "Mill Welds Pipe at High Speeds." This refers to a midwestern firm which has developed a cold forming machine for manufacturing pipe from 6 to 20-in. diameters.

Would you give us the name of this company? *G. L. Revell, President, Cal-Metal Corp., Box 338, Torrance, Calif.*

Further information about this item may be obtained by contacting Mr. Richard Burt, Yoder Co., 5500 Walworth Ave., Cleveland.—Ed.

Low-Cost Turbine Blades

Sir:

We are interested in the forecast "Aim for Low-Cost Turbine Blades" which appeared in "Newsfront" November 10th.

Can you tell us anything more about this idea? *Mrs. E. G. Sittgreaves, Librarian, Ingersoll-Rand Co., Phillipsburg, N. J.*

Write Dr. Donald N. Frey, Asst. Director, Scientific Laboratory, Engineering Staff, Ford Motor Co., Dearborn, Mich.

Title Steel \$

Sir:

I would appreciate receiving six copies of "How to Get More for Your Steel Dollar" in your issue of October 6th. *R. S. Bireline, Asst. Buyer, Caterpillar Tractor Co., Peoria, Ill.*

First of its Kind?



**consider
a ball**

Are you working on something that's never been done before . . . something that has been considered "impossible" . . . something that begins to look "impossible" to you?

Why not consider a ball—a Universal Ball? It may be the key to making your new design work.

When you use a Universal Ball of chrome or stainless steel you get truest accuracy—tolerances better than ten-millionths of an inch! And there's a Universal Ball size for your every need—smaller than a pinhead . . . large as a golf ball—with many sizes in-between. (Universal Balls come in various metals, too—chrome, stainless steel, bronze, solar, aluminum, and special materials.)

A Universal Ball may move your design off the drawing board . . . into production . . . onto the market as fast-selling, profit-making, new merchandise. We guess that's what you'd like to accomplish. May we help you do it?

**Universal
Ball co.**

WILLOW GROVE
MONTGOMERY CO., PA.

**This Photo is
One-Third Actual Size...
OF A COMPLETE VEELOS V-BELT INVENTORY
IN THE O, A, B AND C WIDTHS!**

Put an end to endless space and inventory problems. Four reels of Veelos adjustable v-belt replace up to 316 different sizes of endless belts... and take up a space of only 16 inches square.



Over 350 distributors
throughout the country.
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ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

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with valuable engineering data
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for your copy today.

HANNEN MANUFACTURING & BELTING CO.
653 Nabel St., Mahim, Pa.

fatigue cracks

by William M. Coffey

Hip! Hip!

Hurrah! Huzza! Eureka! We did it! All our scheming, our brilliant planning, our sleepless days were not in vain. We actually, really did it! We're going to get fired. Really canned. Boy!

Just read these letters, Mr. Campbell, and then do your duty. Just read them. And remember, we get thousands like these every week, thousands! Boy!

Sunrod Mfg. Co.

Vice President

F. H. N. Carter

Yours sincerely,

Alka-Seltzer.

In re "Fatigue Cracks," De-

Deer Mr. Coffey:

December 1

* * *

Sunrod Mfg. Co.

Vice President

F. H. N. Carter

Sincerely,

Philly—no stir not never.

never heard no belly talk in

Come to think of it, I ain't

find no materials down thar?

Whassamatter? Can't you

love and stuff.

usster since you got down thar

with all that there brotherly

You isn't as funny as you

have—but you're slipping.

All the troubles and stuff you

Hate to pick on you with

Deer Mr. Coffey:

November 10

We were sure worried about F.H.N. for awhile. He wrote a letter some time ago in which he was somewhat complimentary. It was burned immediately, of course, and we marked F.H.N. down as one of those fellows who stirs up trouble for other fellows. We were wrong, terribly wrong. We have done Mr. Carter a grave injustice. He finally came to his senses and

we can only hope that Editor-in-Chief Tom Campbell comes to his.

After all, it will take a lot of Alka-Seltzer to remedy the damage we're doing and that's not in the budget! Now we can live like other people. Boy!

The Clincher

. . . but just in case, here's some more ammunition for Tom that comes from Mr. Rodney Nickum, scion of a wealthy family, who's been our IRON AGE friend for 47 years, a real friend on our side as you can see.

Boy: "Hey, pappy."

Pappy: "Yep."

B: "Where be ya, pappy?"

P: "Here."

B: "Supper's ready, pappy."

P: "Yep."

B: "Air ya comin' home for supper, pappy?"

P: "Nope."

B: "Ain't ya hungry, pappy?"

P: "Yep."

B: "Then why don't ya come home, pappy?"

P: "Cain't."

B: "Why cain't ya, pappy?"

P: "Caught in a b'ar trap."

Puzzlers

A dog and a rabbit are 100 yards apart. At a given time, the rabbit starts running perpendicular to the line joining him and the dog at a velocity of 30 ft per sec and continues to run in this straight line. The dog also starts running at 40 ft per sec towards the rabbit and the dog always runs directly towards the rabbit. How long does it take the dog to catch the rabbit? Many thanks to Mr. G. Bach, Northern Electric Company, Montreal, for this one.

New Puzzler

A gentleman walked into a bank and asked the teller for change for a one dollar bill and requested fifty coins. How could the teller do this? Thanks for this one to John Day, Lone Star Steel Co.



Rolling Mill Equipment

For more than 50 years Hyde Park Steel Mill equipment has been helping American industry lead the world—equipment such as—



Bar Mills

Merchant Mills

Sheet and Strip Mills

Pinion Stands

Roller Tables

Reduction Drives

Stretcher Levellers

Guillotine Shears

Sheet Mill Shears

Roll Lathes

Special Machinery

Machine Work

For finer finish, long life and greater tonnage, specify Red Circle Rolls.

Hyde Park

FOUNDRY & MACHINE CO.

Hyde Park, Westmoreland Co., Pa.

ROLLS

ROLLING MILL MACHINERY

GREY IRON CASTINGS

A Metallurgist?

WHO? ME?



Well, maybe not exactly, but if you buy steel it's important that you, as a Purchasing Agent, know many details for which your technical contemporaries usually get the credit. Your knowing certain fundamentals can save your company many dollars and shorten delivery time by weeks.

As a case in point, take tubing size. A recent heat exchanger job called for three pieces of 18-8 Ti (TP321) tubing, each with different diameters and lengths. They were odd sizes, not available in stock. Delivery time would have been eight to ten weeks, and the customer would have had to buy minimum

mill quantities, or four times more material than he wanted.

This smart customer (1) called in helpful Mr. Tubes, (2) converted to available pipe sizes while maintaining the original working pressures, (3) purchased a more expensive grade and still saved money, (4) cut delivery to less than four weeks, (5) stayed within his original cost estimate.

You don't have to be a metallurgist to realize that a basic understanding of tubing—plus a timely assist from Mr. Tubes, your link to B&W—can often save both time and money.

THE BABCOCK & WILCOX COMPANY TUBULAR PRODUCTS DIVISION

General Offices: Beaver Falls, Pennsylvania
Plants: Beaver Falls, Pa.; Alliance, Ohio; Milwaukee, Wis.
Seamless and Welded Tubing and Pipe, Seamless Welding Fittings
and Flanges—in Carbon, Alloy and Stainless Steels

TA-506FG



dates to remember

JANUARY

INSTITUTE OF SCRAP IRON & STEEL, INC.—Annual convention, Jan. 3-6, Hotel Sherman, Chicago. Society headquarters, 1729 H St., N.W., Washington, D.C.

SOCIETY OF AUTOMOTIVE ENGINEERS, INC.—Annual meeting, Jan. 9-13, The Sheraton-Cadillac Hotel and Hotel Statler, Detroit. Society headquarters, 29 W. 39th St., New York.

AMERICAN ROAD BUILDERS' ASSN.—54th annual convention, Jan. 11-14, Miami Beach, Fla. Assn. headquarters, World Center Bldg., Wash. 6, D.C.

EXPOSITIONS

1956

ASTE—Industrial exposition, March 19-23, Chicago.

MATERIALS HANDLING SHOW, June 5-8, Cleveland.

STEEL SHIPPING CONTAINER INSTITUTE, INC.—Winter meeting, Jan. 18-19, Hampshire House, New York City. Society headquarters, 600 Fifth Ave., New York City.

COMPRESSED GAS ASSN., INC.—Annual meeting, Jan. 23-24, The Waldorf-Astoria, New York. Society headquarters, 11 W. 42nd St., New York.

INDUSTRIAL HEATING EQUIPMENT ASSN., INC.—Annual meeting, Jan. 23-24, LaSalle Hotel, Chicago. Assn. headquarters, 155 E. 44th St., New York.

TRUCK-TRAILER MANUFACTURERS ASSN.—15th annual convention, Jan. 23-25, Edgewater Gulf Hotel, Edgewater Park, Miss. Assn. headquarters, 1042 National Press Bldg., Washington, D.C.

PLANT MAINTENANCE & ENGINEERING SHOW—7th annual conference, Jan. 23-26, Convention Hall, Philadelphia. Society headquarters, Clapp & Polick, Inc., 341 Madison Ave., New York.

NATIONAL RURAL ELECTRICAL CO-OPERATIVE ASSN.—14th annual meeting, Jan. 23-26, St. Louis, Mo. Assn. headquarters, 155 E. 44th St., New York City.

AMERICAN STANDARDS ASSN.—Galliard Seminar on industrial standardization, Jan. 23-27, New York City. Assn. headquarters, 70 E. 45th St., New York.

ENGINEERS JOINT COUNCIL—Second annual general assembly, Jan. 26-27, Hotel Statler, New York City. Society headquarters, 29 W. 39th St., New York.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Winter general meeting, Jan. 30-Feb. 3, Hotel Statler, New York. Society headquarters, 36 W. 46th Street, New York City.

Believe it or not!



a Machine Tool Weldment

Bases like this, Fabricated by Acme

excel in Strength, Rigidity, and Precision

— Finish . . . save Weight and Cut Costs.

No Design is too complicated

. . . not even Yours!

In Doubt? Ask for Bulletin B-3
"The Facts about Weldments and Castings"



ACME WELDING

DIVISION OF THE UNITED TOOL & DIE CO.

1044 NEW BRITAIN AVE., W. HARTFORD, CONN.

STEEL
STAINLESS STEEL
EVERDUR
ALLOYS

A.S.M.E. U68-U69 Qualified Welders • A.P.I.-A.S.M.E. Approved
Underwriters Label and Inspection Service • Navy Approved
National Board Approved • Hartford Steam Boiler Inspection Service



**STANDARD OIL
COMPANY**
(Indiana)

Tool Room Superintendent Max Chase (left) and Production Engineer Peter Van Dyke (right) with Standard lubrication specialist R. T. Cleland inspect frame of extruded aluminum. Bob Cleland, a graduate of Michigan State with a B.S. in Mechanical Engineering and of Standard's Sales Engineering School, has the background to provide customers with competent technical service on their lubrication problems. This training and experience, customers have found, pay off for them.

STANOIL Industrial Oil

does heavy chores

for Light Metals Corporation

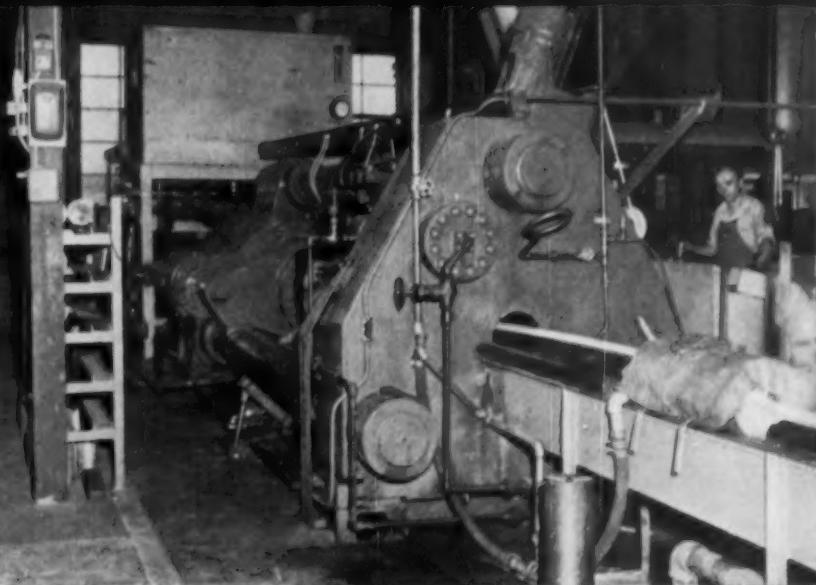
Three years ago Light Metals Corporation, Grand Rapids, put their 1,250 ton Hydropress into operation. The initial fill for the hydraulic system was STANOIL Industrial Oil. The press has operated continuously since its start up. There is no evidence of deposits or varnish anywhere in the hydraulic system. Light Metals Corporation looks forward to many more years of such trouble-free operation.

Why was STANOIL ordered by Light Metals for their Hydropress? The answer is found in the service STANOIL has given in other equipment. Back in 1948 when a Watson-Stillman extrusion press went into operation for Light Metals, STANOIL was chosen as the hydraulic oil. As with the Hydropress, STANOIL has a perfect per-

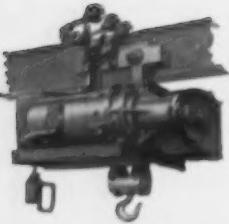
formance record. The Watson-Stillman press has operated seven years without a shutdown because of hydraulic fluid failure.

This kind of service from a hydraulic oil means Light Metals Corporation can turn out extruded aluminum shapes for the aircraft, automotive and major appliance industries with high performance and low maintenance factors that mean bigger profits. Reason enough for relying on STANOIL.

STANOIL Industrial Oil can perform for you just as it is doing for Light Metals Corporation. In the Midwest a lubrication specialist from your nearby Standard Oil office will explain how. Call him. Or contact, Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

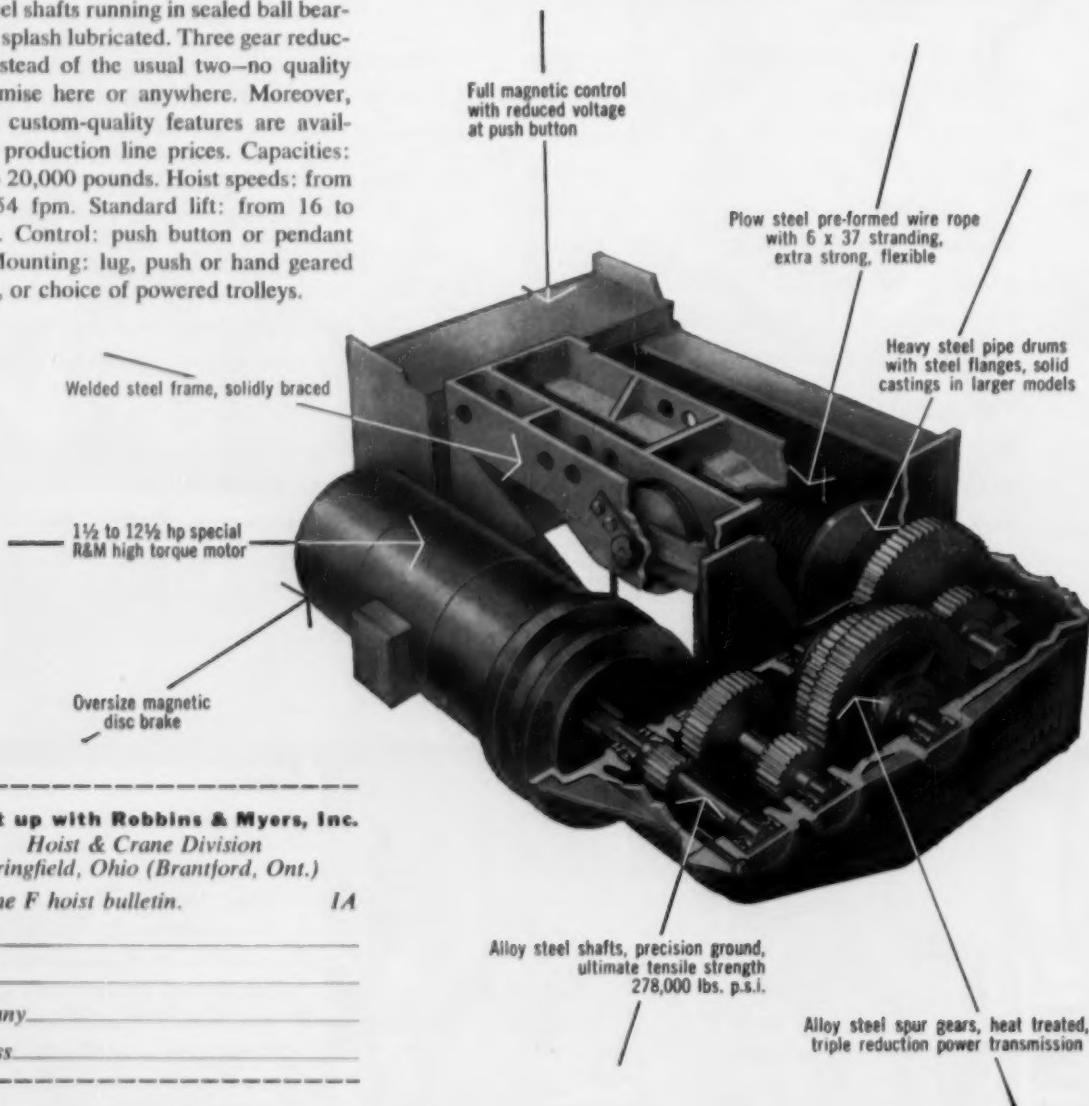


Light Metals Corporation uses this 1,250 ton Hydropress for extrusion of aluminum shapes for aircraft, automotive and major appliance industries. Press operates at 2,840 psi in the hydraulic system. Hydraulic medium is STANOIL.



(F) F hoists cut down the cost of lifting but the F hoists save still more money. Dollars usually spent on maintenance become dollars earned because of the extra stamina built into each component. Look at the gearing—here are precision cut alloy steel spur gears, wide faced and heat treated for durability. They're mounted on alloy steel shafts running in sealed ball bearings, all splash lubricated. Three gear reductions instead of the usual two—no quality compromise here or anywhere. Moreover, F hoist custom-quality features are available at production line prices. Capacities: 1000 to 20,000 pounds. Hoist speeds: from 10 to 54 fpm. Standard lift: from 16 to 40 feet. Control: push button or pendant rope. Mounting: lug, push or hand geared trolleys, or choice of powered trolleys.

choose a hoist with extra stamina



take it up with Robbins & Myers, Inc.

Hoist & Crane Division
Springfield, Ohio (Brantford, Ont.)

Send me F hoist bulletin. IA

Name _____

Title _____

Company _____

Address _____

ROBBINS & MYERS

hoists • cranes • winches

**SNYDER SEGMENTED
AUTOMATION** in 91 station,
182 operation, in-line transfer machine
features four segments which can
operate independently or as a unit to
assure continuous production of auto-
motive automatic transmission cases at
100 cases an hour at 80% efficiency

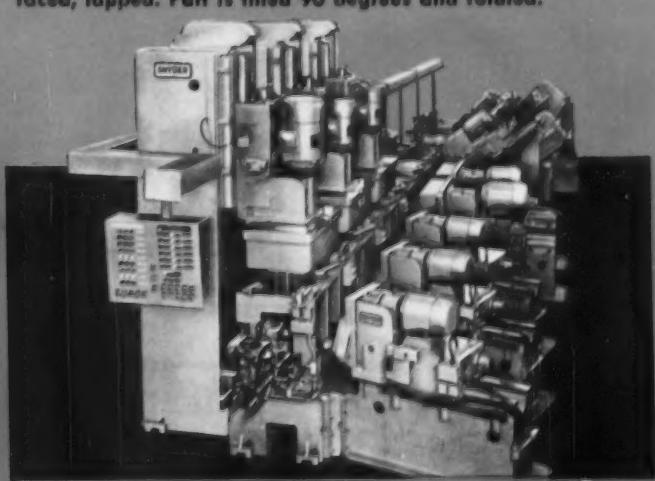
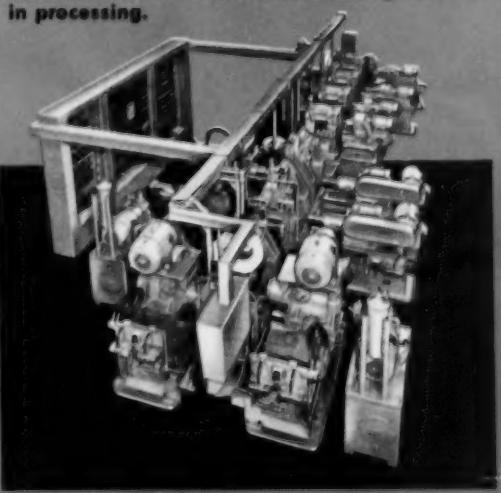
SNYDER

**TOOL & ENGINEERING COMPANY
3400 E. LAFAYETTE, DETROIT 7, MICHIGAN**

30 Years of Successful Cooperation with Leading American Industries

SEGMENT 1: 40 feet long, 19 stations, 10 spindles. Part manually loaded, both ends face milled, counterbored, three diameters rough and finish bored and faced, two pads side milled, pump pad face milled, clearance slot milled. Part tilted 90 degrees in processing.

SEGMENT 2: 47 feet long, 31 stations, 91 spindles. In top face, end and at angular locations inside, 81 holes are drilled, countersunk, semi-finish and finish reamed, spot-faced, tapped. Part is tilted 90 degrees and rotated.





SNYDER TOOL and ENGINEERING COMPANY



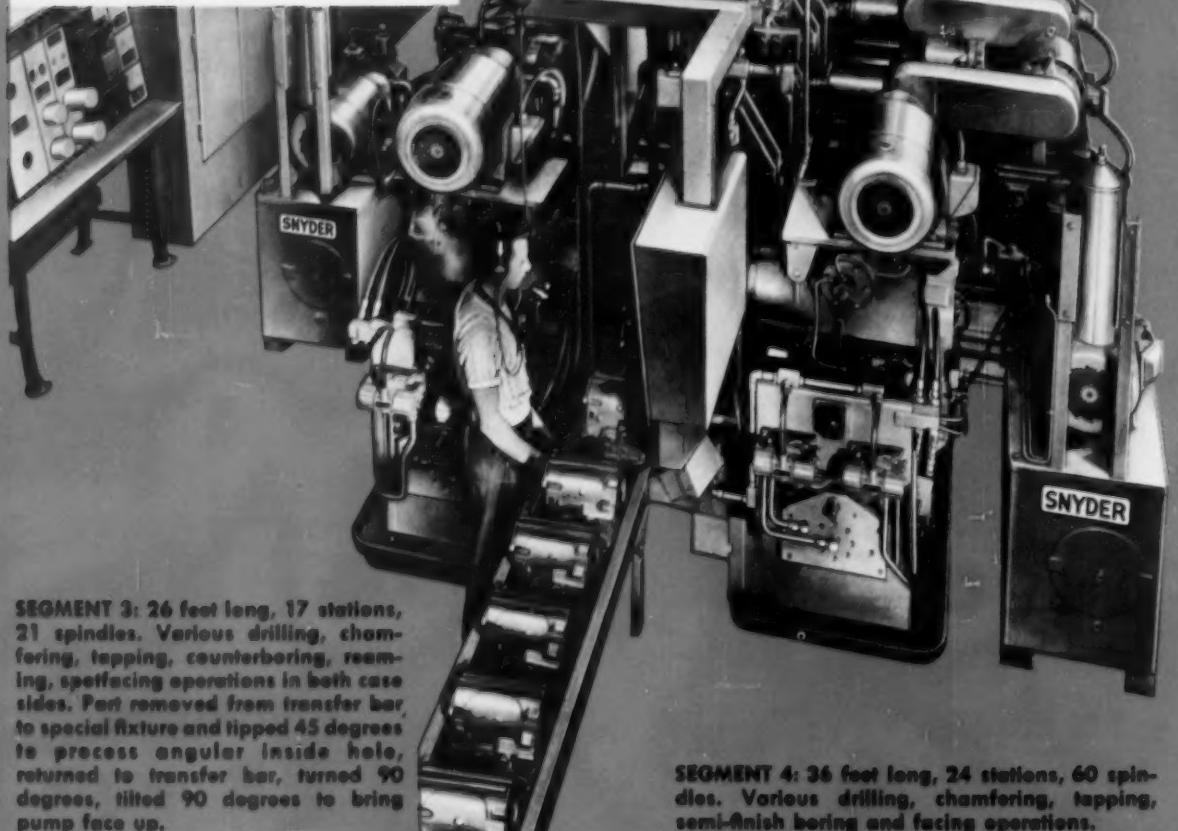
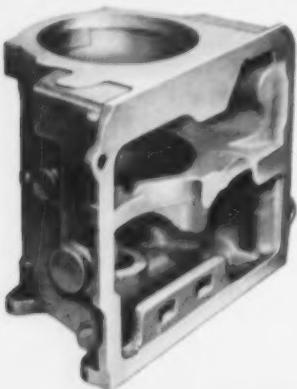


As a fitting climax to our thirtieth anniversary year, we are happy to announce plant expansions which will add about one third to our machine shop and assembly floor areas and which will enable us to add to our precision machining equipment and accommodate more

manpower. We are happy, too, to take this opportunity to thank all our friends who have made this modern plant possible—our customers, our suppliers and all of the hundreds of members of the Snyder family of workers, here and throughout the country.

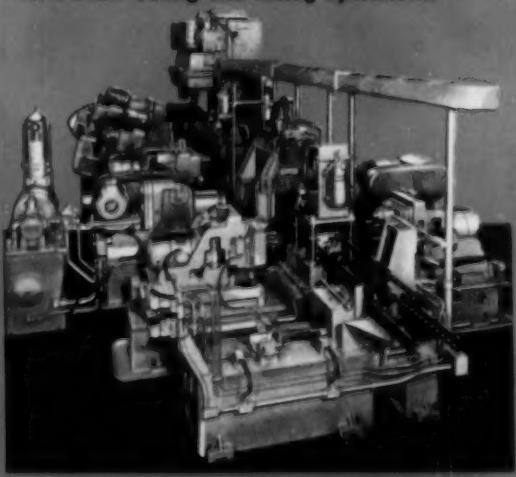
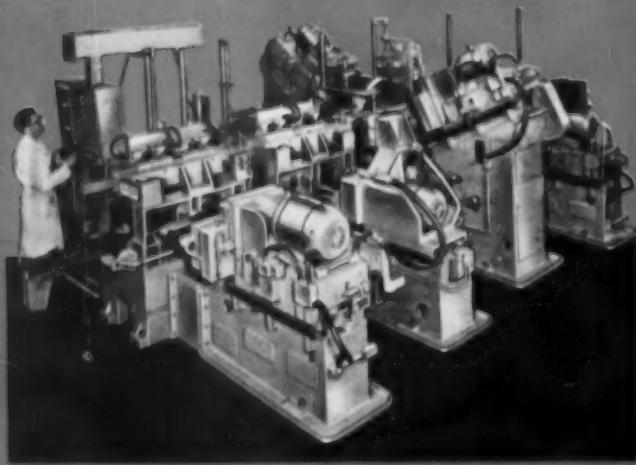
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SEGMENT 3: 26 feet long, 17 stations, 21 spindles. Various drilling, chamfering, tapping, counterboring, reaming, spotfacing operations in both case sides. Part removed from transfer bar, to special fixture and tipped 45 degrees to process angular inside hole, returned to transfer bar, turned 90 degrees, tilted 90 degrees to bring pump face up.

SEGMENT 4: 36 feet long, 24 stations, 60 spindles. Various drilling, chamfering, tapping, semi-finish boring and facing operations.





"Control tower"

FOR YOUR INDUSTRIAL NEEDS

He co-ordinates hundreds of "arrivals" and "departures" every day. With the sure accuracy of long experience he brings 'em in and sends 'em out — *on time*. In emergencies, his specialized knowledge can save the day. His job, complex and fast-moving, is devoted to a single purpose: serving you. *This man is your Industrial Distributor.*

HOW THE INDUSTRIAL DISTRIBUTOR HELPS YOU MAKE MORE AND BETTER PRODUCTS AT LOWER COST

- He helps you keep your costs "on the beam." According to the authoritative magazine, *Industrial Distribution*, he saves you more than \$10 out of every \$100 you spend annually for supplies and equipment. Your Industrial Distributor assumes for you the expenses of office overhead, insurance, depreciation, etc., that you would have to pay if you stocked for yourself the items he supplies.
- He simplifies your industrial purchasing. A single, convenient source for all your needs, he's as easy to reach as your telephone. And he saves you time and expense by

keeping you posted on new developments and tracking down hard-to-find items for you.

- His advice is sound and his delivery of needed equipment speedy. Count on him in time of trouble, as a pilot does on an airport tower, to help keep your plant humming smoothly.
- He saves money for the firms who make the supplies and equipment you buy, just as he saves money for you, by reducing their costs of inventory and distribution. Result: lower prices than if you bought direct from these suppliers.

Imagine an airport without a control tower, where every plane had to call every other plane! Imagine the hopeless confusion of Industry, where every industrial consumer had to deal directly with every supplier for his needs. That's why Nicholson File Company firmly believes that the Industrial Distributor way of marketing gives you the best service at the lowest cost. We have marketed exclusively through distributors for more than 40 years.

Your Industrial Distributor's field men have highly specialized knowledge of files and filing. Are you taking fullest advantage of their sound technical advice?

NICHOLSON

World's foremost manufacturer of A FILE FOR EVERY PURPOSE

FILE COMPANY

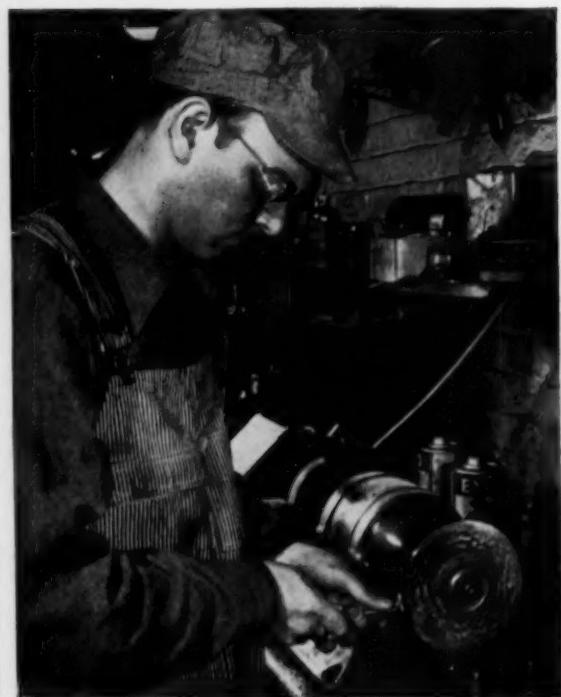
NICHOLSON U.S.A. Providence, R. I.

(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

C F & I - W I C K W I R E M A K E S W I R E



BRUSH OFF. Power brushes for polishing, deburring and rough metal finishing use CF&I-Wickwire Brush Wire.



HIGH FASHION FASTENERS. This eye-catching gown has hook and eye fasteners made of CF&I-Wickwire Hook and Eye Wire for secure, inconspicuous closures.

F O R T H O U S A N D S O F U S E S

*from dressing up a beautiful lady...
to dressing down a metal casting...
nothing has so many uses as wire!*



NO SHATTERED WINDOWS in this factory. The hex mesh netting for plate glass reinforcement is made of annealed CF&I-Wickwire Glass Netting Wire.



SOLE SUPPORT. Millions of nails—from shoemaker's tacks to heavy spikes—are used annually by scores of industries. Nails are made from CF&I-Wickwire Industrial Quality Basic Wire.



PIN-UP has been a snap for mothers ever since the invention of the safety pin. Today, millions of these indispensable fasteners are made from CF&I-Wickwire Safety Pin Wire.



FOR DRIVING SAFETY. This windshield wiper is operated by dependable, high tensile strength CF&I-Wickwire Cord Wire.

Everybody knows that steel is indispensable to today's manufacturer, today's living . . . yet few people realize that wire is the most widely applicable, the most versatile form in which steel is used. Here's the reason—wire lends itself to thousands of extremely diversified applications. Strength? Wire has it. Ductility? Wire is the first thing you think of. Good looks? Wire can be plated and finished in many attractive ways. On

every score, nothing offers so many useful and variable properties as wire.

Whatever you make, process, or assemble, you'll find that CF&I-Wickwire Wire fits into the picture to perfection. We have the experience and the facilities to provide exactly the wires you need from plants conveniently located from coast to coast. Write our nearest sales office for complete details.

3148

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Denver

El Paso • Ft. Worth • Houston • Lincoln (Nebr.) • Oklahoma City • Phoenix • Pueblo • Salt Lake City • Wichita

PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane

WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia





1. Rough cast bars require extensive machining before reaching usable bronze.

2. Johnson Universal Bronze Bars are completely machined inside, outside and on the ends. There's no waste.

Why pay for bronze you can't use?

That's exactly what happens when you buy rough cast bronze bars of uncertain chemical analysis that require cutting away as much as 25% of the metal inside and outside before you reach usable bronze.

Johnson guaranteed quality Universal Bronze Bars in over 400 standard sizes made of Johnson alloy No. 72 are completely machined, save you time and money because they are ready to finish into bearings, washers, thrust plates, gears, pinions, guides, rollers, sheaves, trolley wheels and other parts for your original equipment and maintenance.

Cored bars are available from stock in 354 size combinations in standard lengths

of 13" with ID's ranging from $\frac{1}{2}$ " to 8", minus $\frac{1}{32}$ ". OD's range from 1" to 10", plus $\frac{1}{32}$ ". Thickness of wall stock ranges from $\frac{1}{4}$ " to $2\frac{1}{2}$ ", plus $\frac{1}{32}$ ".

The size of each bar is plainly stamped on both ends for your convenience. This eliminates needless handling and measuring to find the size you want.

Centering holes (see illustration) are punched on ends of each Johnson bar to save costly set-up time.

Solid (36 sizes) and hexagonal (20 sizes) bars are also available from stock.

Ask your distributor or write for catalog to Johnson Bronze Co., 505 S. Mill St., New Castle, Pa.

Johnson Bronze Company



GRAPHITED
over 175 sizes



GENERAL PURPOSE
over 900 sizes



UNIVERSAL BRONZE BARS
over 400 sizes



LEDALOYL
over 400 sizes



ELECTRIC MOTOR
over 350 sizes

FACTS

about

NEW DEPARTURE
BALL BEARINGS



New Sentri-Seal...on guard against dirt and wear!

The unique design of the Sentri-Seal gives optimum protection against dirt, and includes a number of other major advantages.

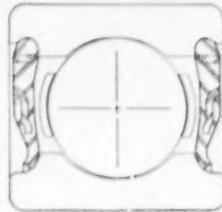
Sentri-Seals are quickly removed, easily replaced. As the seal is of synthetic rubber, in which two metal rings are embedded, a constant-rate spring is created between the rings. Inherent flexibility prevents distortion of the bearing outer ring due to seal insertion, permitting the use of bearings to the higher accuracy specifications. The spring action maintains an efficient sealing contact with the bearing ring to bar dirt and retain lubricant. Sentri-Seals are relatively inert to oils and greases and operate satisfactorily through a temperature range of -40°F to 225°F. Specifications available for still higher temperatures. In applications where relubrication is desired, it is easily accomplished by the injection method.

The New Departure Sentri-Seal basically consists of two separate metal rings, "A" and "B", embedded in synthetic rubber, resulting in a spring which absorbs distortion and deflection. The seal is not drastically influenced by axial displacement due to bearing endplay within prescribed tolerances, and provides efficient sealing at low torque. Bearing shown is equipped with two seals.



The diagram shows in section the New Departure Sentri-Seal. Lip contacting surfaces are form-ground simultaneously with the ball race, giving an extremely high degree of concentricity between sealing surfaces and the raceway. Sentri-Seal is available for a range of sizes in single-row, standard-width bearings and also in two types of New Departure adapter bearings. Sizes, dimensions and capacities are listed in the latest New Departure catalog.

Write for full details on Sentri-Seal



NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONN.

December 15, 1955

Every Feature Worth a Close, Close Look!



Why Fight Chips? Bedway design provides chutes to empty chips into open pan at rear of lathe. Simple, practical, time-saving.

Headstock With a Brain! Dial work diameter setting and surface cutting speed setting. Dyna-Shift headstock automatically calculates required spindle speed and shifts to it hydraulically. No mental gymnastics — no compromise speeds!

Two for One. When turning medium steel, 1 cubic inch of metal removal per motor horsepower has been considered good performance. On the Series 80 you can raise that to over 2 cubic inches per motor horsepower.

You're Right There! No stretch, no reach, no awkward lifting. Lathe has clean, close front with spindle right under hands.

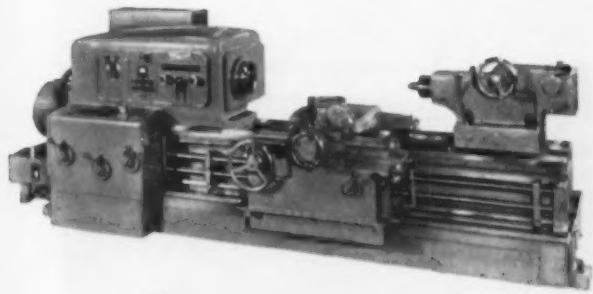
Support Without a Thought. On longer bed lathes, the lead-screw, feed and control rods are continually supported by traveling carriers that are automatically picked up and dropped off by apron movement.

Infinitely Variable — Infinitely Effective. Variable speed four-way hydraulic rapid traverse of carriage and cross slide brings tool to work at the rate of travel you choose—does away with final manual positioning.

The Monarch Series 80 DYNA-SHIFT . . . The New Look in Heavy-Duty Lathes



Nimble Tailstock.
Two speed range spindle movement — *power positioning* provided by engaging plunger on carriage and using longitudinal power rapid traverse.



MONARCH SERIES 80 DYNA-SHIFT LATHE, 36 Spindle Speeds. Headstock Ratio—125 to 1.

Models 1600 and 1601. Clearance diameter 26" and 30". Swing over cross slide 16" and 20". Speed Range 10-1250 RPM.

Models 2000 and 2001. Clearance diameter 32" and 36". Swing over cross slide 20" and 24". Speed range 8-1000 RPM.

Here's the lathe that's the talk of the shop and front office alike! The new Monarch Series 80 Dyna-Shift provides a completely new approach to the problem of heavy-duty metal turning—and the results are a rate of metal removal beyond the reach of previous designs; plus added production caused by the many exclusive, new built-in conveniences.

A look at just the few features pictured here tells why. Every one adds to the increased productivity and ease of operation of the machine. And there are so many more that we've prepared a complete, illustrated booklet to tell you about them. For full information on the lathe that gives you ultimate proficiency in the use of carbide tooling on work of considerable size—send for our Booklet #1602 **The Monarch Machine Tool Company, Sidney, Ohio.**



Clip this coupon to Your Letterhead
for Complete Dyna-Shift Booklet

MONARCH MACHINE TOOL COMPANY
Sidney, Ohio

Please send me your illustrated booklet #1602 describing the Series 80 Dyna-Shift Lathe.

NAME _____

TITLE _____



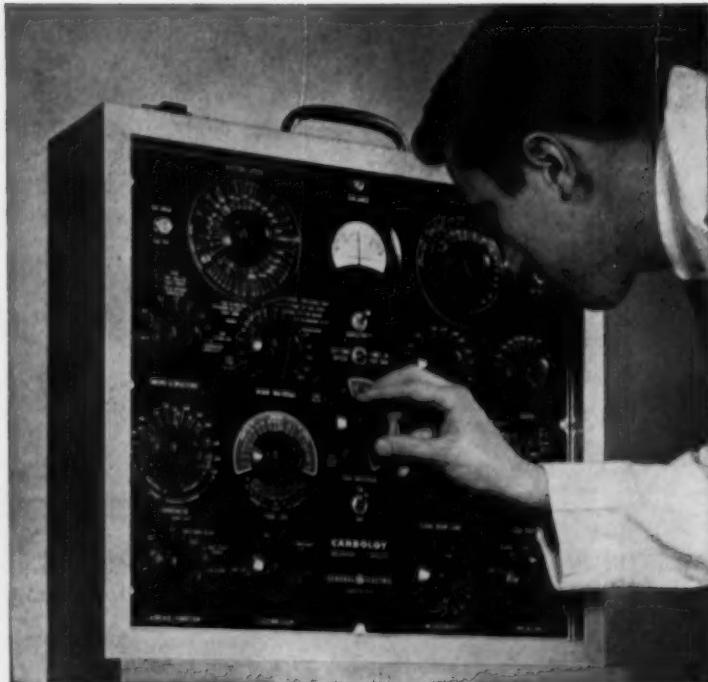
SOLVE MACHINING PROBLEMS IN SECONDS

The Carbology Machinability Computer can determine the most efficient values for any of these 19 basic operating variables:

Material to be cut: Work material, microstructure, hardness, surface condition.

Cutting tool: Tool material, tool life, flank wear land, tool profile, type of tool, number of teeth.

Cutting conditions: Cutting fluids, feed, depth of cut, cutting speed, motor horsepower, cubic inches per minute, unit horsepower, work diameter, R.P.M.



CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY



Set dials for the values of each of the known variables. (Time: 1 - 2 minutes.)



Turn dial of unknown variable until meter balances at zero setting. (Time: 10 - 15 secs.)



Read the answer directly off the dial. No computations are necessary. (Time: 10 secs.)

WITH CARBOLOY MACHINABILITY COMPUTER

- ▶ Calculate production, tool life, horsepower, or any of 16 other basic machining variables
- ▶ Eliminate wasteful tryout runs, improve existing setups

The Carboloy Machinability Computer is a new engineering tool designed to solve complex machine setup problems in seconds, instead of hours.

It calculates the effect of the 19 most critical machining variables on the material to be cut, the cutting tool, and the cutting conditions . . . shows how to set up optimum operating conditions for any metal-cutting job, and how to improve existing setups by the right variation of operating conditions.

For production men, methods men, etc.

The Computer assists production men by determining rate of metal removal, and by immediately showing how production is affected by changes in feed, speed, depth of cut, tool material, and other key variables.

The Computer eliminates wasteful, nonproductive trial runs, saving valuable stock and setup time. It also determines machine output for methods men, pieces per hour for estimators, and it answers other problems pertaining to machining . . . providing accurate solutions in seconds for problems that normally take hours for even approximate answers.

Easy to use

The Carboloy Machinability Computer is easy to operate. Anyone with machining experience can use it after a short familiarization period.

The computer is portable (weighs only 32 lbs.), battery-operated, and measures 21" x 7" x 20". The price of the computer is \$495, f.o.b. factory, Detroit.

Whether your plant is large or small, the Carboloy Machinability Computer can pay for itself by increasing production, reducing manpower costs. For full details, or to arrange a demonstration at your plant, send coupon today.

CARBOLOY

Department of General Electric Company
11153 E. 8 Mile Street, Detroit 32, Michigan

- Send me information on the Carboloy Machinability Computer.
 Have a representative call to demonstrate the Computer.

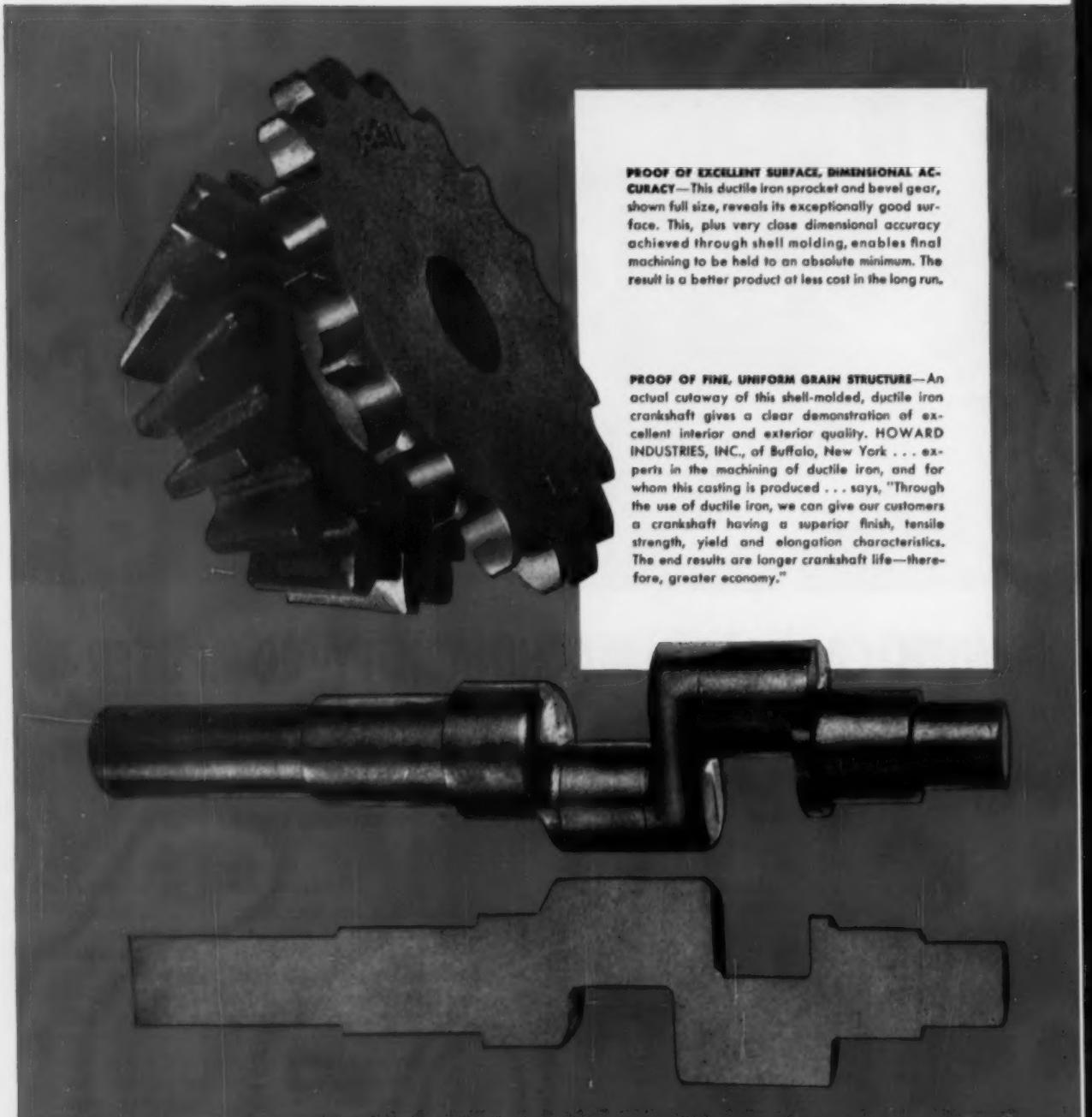
Name _____

Title _____

Company _____

City _____ Zone _____ State _____

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company



PROOF OF EXCELLENT SURFACE, DIMENSIONAL ACCURACY—This ductile iron sprocket and bevel gear, shown full size, reveals its exceptionally good surface. This, plus very close dimensional accuracy achieved through shell molding, enables final machining to be held to an absolute minimum. The result is a better product at less cost in the long run.

PROOF OF FINE, UNIFORM GRAIN STRUCTURE—An actual cutaway of this shell-molded, ductile iron crankshaft gives a clear demonstration of excellent interior and exterior quality. HOWARD INDUSTRIES, INC., of Buffalo, New York . . . experts in the machining of ductile iron, and for whom this casting is produced . . . says, "Through the use of ductile iron, we can give our customers a crankshaft having a superior finish, tensile strength, yield and elongation characteristics. The end results are longer crankshaft life—therefore, greater economy."



LFC'S NEW SHELL-MOLDING FOUNDRY is a highly mechanized, completely integrated unit. Modern facilities are provided for all operations from raw material storage to finished product shipping. Matching these facilities with the best in materials pays off in superior castings and efficiency.

PROOF:

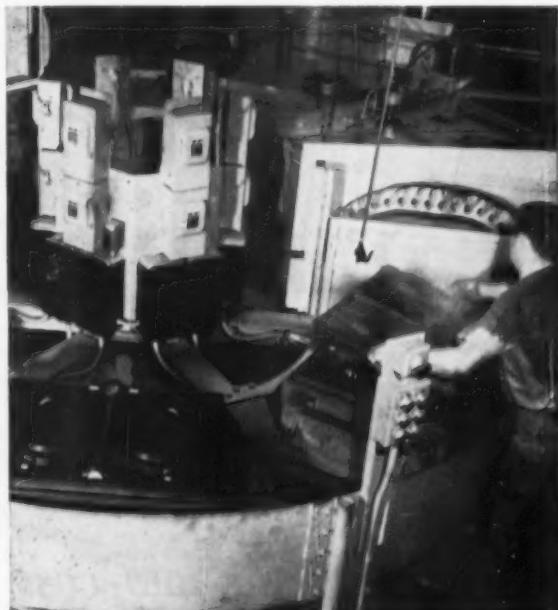
Chateaugay Pig Iron . . . ideal base metal for shell-molded, ductile iron castings

For years, the Lynchburg Foundry Company, Lynchburg, Virginia, has used Chateaugay—Republic's exclusive premium Pig Iron—for castings requiring outstanding high strength, uniformity and machinability. Further, Chateaugay gave them added benefits through its ability to fill adjacent light and heavy sections evenly, plus a fine and uniform grain structure . . . and an exceptionally good surface with high wear-resistance.

Now, with their new shell-molding foundry in production, Chateaugay Pig Iron has proved to be the ideal base metal for Lynchburg Foundry's ductile iron castings, produced by this modern method.

Basically, Chateaugay's very high carbon and unusually low sulphur, phosphorous and manganese content suit it perfectly for ductile iron use. Beyond this, however, its inherently excellent physical properties are maintained in the ductile form, so that LFC is assured of consistent top quality in every casting. Finally, Chateaugay's naturally good surface and uniform shrinkage characteristics enable LFC to maximize, in each casting, the superior surface finish and closer dimensional accuracy advantages of the shell-molding process.

For the complete story on Chateaugay, the low-phosphorous, copper-free pig iron, call in a Republic Pig Iron Metallurgist. There is no cost or obligation for his services. Simply contact your local Republic representative to let us know when you would like him to call.



NEW, AUTOMATIC SHELL-MAKING MACHINE is typical of the up-to-date methods employed in Lynchburg Foundry Company's shell-molding process. Consistent high-quality production of ductile iron castings is assured through the use of Chateaugay Pig Iron as the base metal.

REPUBLIC STEEL

*World's Widest Range
of Standard Steels and Steel Products*

REPUBLIC STEEL CORPORATION
3104 East 45th Street
Cleveland 27, Ohio



Please have a Pig Iron Metallurgist call.

Name. _____

Company. _____

Address. _____

City. _____ Zone. _____ State. _____

*Now...modernize your grinding operations
without draining away your capital!*

Take advantage of the **Norton**
Grinding Machine
Lease Program

*for low-cost leasing of new
Norton grinders and lappers*

Naturally, you want to meet competition on at least equal terms—with the latest and best in modern grinding equipment.

Yet, like so many other manufacturers, you may want to conserve your working capital—and so the cost of replacing inefficient producers is delaying, if not prohibiting, your modernization.

What's the answer?

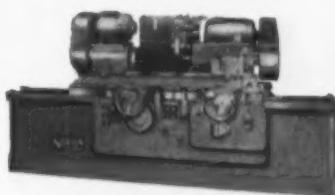
The answer is the Norton Grinding Machine Lease Program, developed to help manufacturers secure the grinders

and lappers they need for modernization—without weakening their financial position.

The new Norton Program gives you three separate plans for leasing new Norton grinders and lappers, with payments extending over a seven-year period. Each plan meets specific requirements. Each plan is extremely flexible, providing for early termination of the lease, or purchase of the equipment, at your option.

One of these plans may help pave the way to better business for you. Don't miss getting complete facts on them—send in the coupon!

*This folder tells you how you can
pay for Norton machines
while they're building
your profits!*



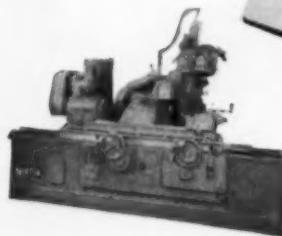
10 x 36" Type CTU Semiautomatic Cylindrical Grinder



8" Hydraulic Surface Grinder



No. 20 Cutter and Tool Grinder

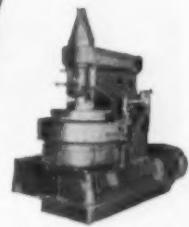


Type CV-4 Semiautomatic Angular Wheelslide Grinder

Presenting...

the **NORTON**
Grinding Machine
Lease Program

Three tested plans that enable you to modernize with
new grinders and lappers while conserving your capital.



No. 26 HYPROLAP* Lapping Machine



12" Universal Grinder

Under the Norton Grinding Machine Lease Program the machines illustrated here—and many more—are now available to you, under low-cost, flexible leasing arrangements.

This folder describes the Program giving details of

the three different plans by which you can improve your competitive position and profits. Send for it now—and remember: only Norton brings you such long experience in both grinding machines and grinding wheels to help you produce more at lower cost.

To Economize, Modernize With NEW

NORTON

GRINDERS and LAPERS

Making better products . . . to make your products better

District Sales Offices: Worcester • Hartford
New York (Teterboro, N. J.) • Cleveland • Chicago • Detroit

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

NORTON COMPANY, Machine Division
Worcester 6, Mass.

Please send me your folder on the Norton Grinding Machine Lease Program.

Name.....

Title.....

Company.....

Address.....

City..... Zone..... State.....



F5100
(METAL)

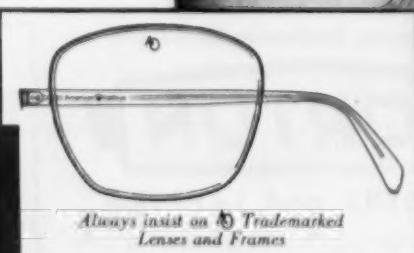
Eye Accident Costs Go Down when AO[†] Safety Glasses like these Go On!

F9500
(PLASTIC)

The workers illustrated are wearing AO's NEW *safety* glasses. Because these glasses are comfortable and good looking (as well as of the highest quality) they will be willingly worn. BECAUSE THEY WILL BE WILLINGLY WORN THEY WILL PAY FOR THEMSELVES *MANY TIMES OVER* IN THE EYE ACCIDENT COSTS THEY SAVE.

Ask an AO Safety Representative to show you how little *quality* protection costs. Or write American Optical Company, 5712 Vision Park, Southbridge, Massachusetts, for booklet.

NOTE: Male worker is wearing the new AO metal goggle. Lady is wearing the new AO plastic goggle.



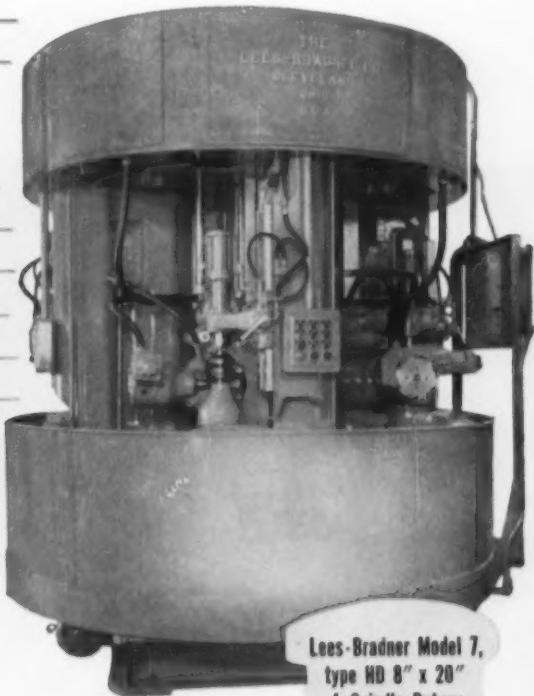
Always insist on AO Trademarked
Lenses and Frames

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES
†U.S. REG. BY AMERICAN OPTICAL COMPANY

LEES-BRADNER
Sets the
HOBBING
pace for tomorrow

with 4 machines in 1



Lees-Bradner Model 7,
 type HD 8" x 20"
 4-Spindle Rotary
 Hobber. Also
 available in single
 and 6-spindle models.



View of new Type HD headstock
 with increased bearing surface
 between column and headstock,
 heavier casting, coolant and
 chip carry-away.

Here's a complete hobbing production line in one space-saving unit.

Actually the Lees-Bradner Model 7, Type HD 4-Spindle Hobber is four separate and independently operative machines in one. Each hobbing unit incorporates basically the same automatic, high-production features as the remarkable 7 type HD Single Spindle Hobber. This includes a heavier, more rugged headstock, heavy-duty column and a 10 H.P. motor.

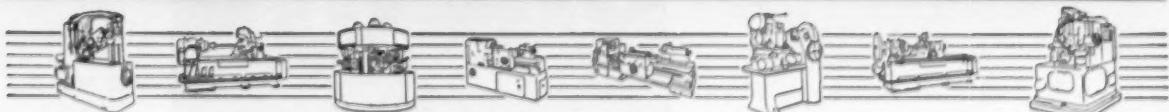
This amazingly efficient machine

not only saves valuable floor space but, with its pushbutton controls and automatic features, actually controls the operator thus reducing the chance for human error or slowdown. Chips and coolant are easily carried away from the headstock by the elimination of flat surfaces.

So, if your manufacturing space is valuable and high unit production important, ask your Lees-Bradner representative to give you the story on the ultra-efficient 4-spindle rotary hobber. Write or wire us direct for his name and address in your area.

the **LEES-BRADNER** *Company*

CLEVELAND 11, OHIO, U.S.A.



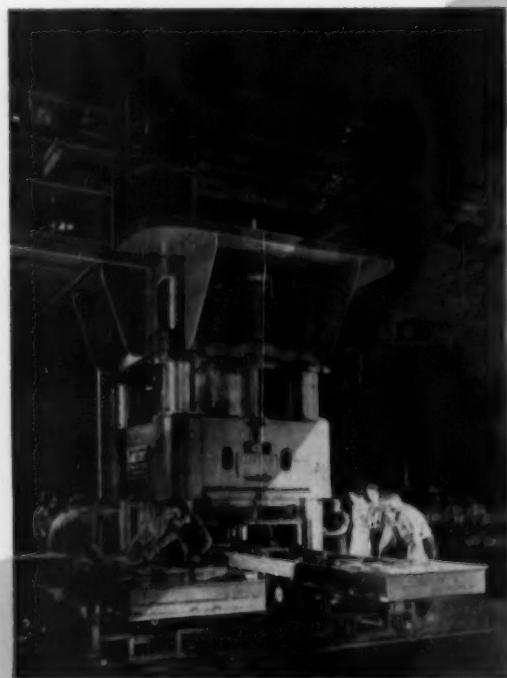
MODEL A HOBBER 4-T THREAD MILLER 7-A ROTARY HOBBERS CRI-DAN THREADING MACHINES MODEL 40 THREAD MILLER 8H SPLINE HOBBER 12-S HOBBER

IF YOU THREAD OR HOB . . . GET A BETTER JOB WITH A LEES-BRADNER



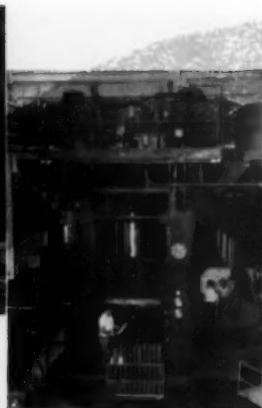
FROM BATHTUBS

TO AIRCRAFT PARTS...





APPLIANCES



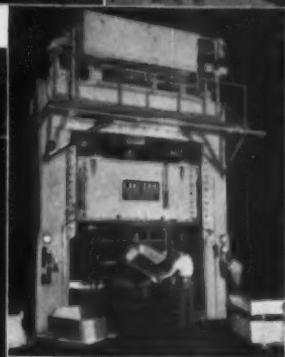
ORDNANCE



FARM MACHINERY



AUTOMOTIVE PARTS

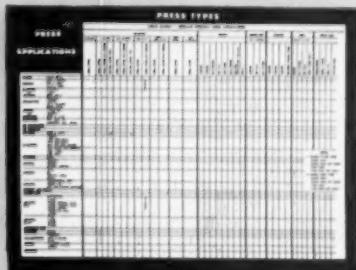


IMPLEMENT

Lake Erie Presses Make **EVERYTHING**

"Everything" is a broad term...but suppose you be the judge as to whether your production could be *hydraulically-pressed* to advantage. Pressing metal into a desired shape reduces or completely eliminates costly machining and scrap. For help in reaching a decision regarding this newer method of production, use our competent engineering assistance freely.

SEND FOR
HANDY
BUYER'S
GUIDE →

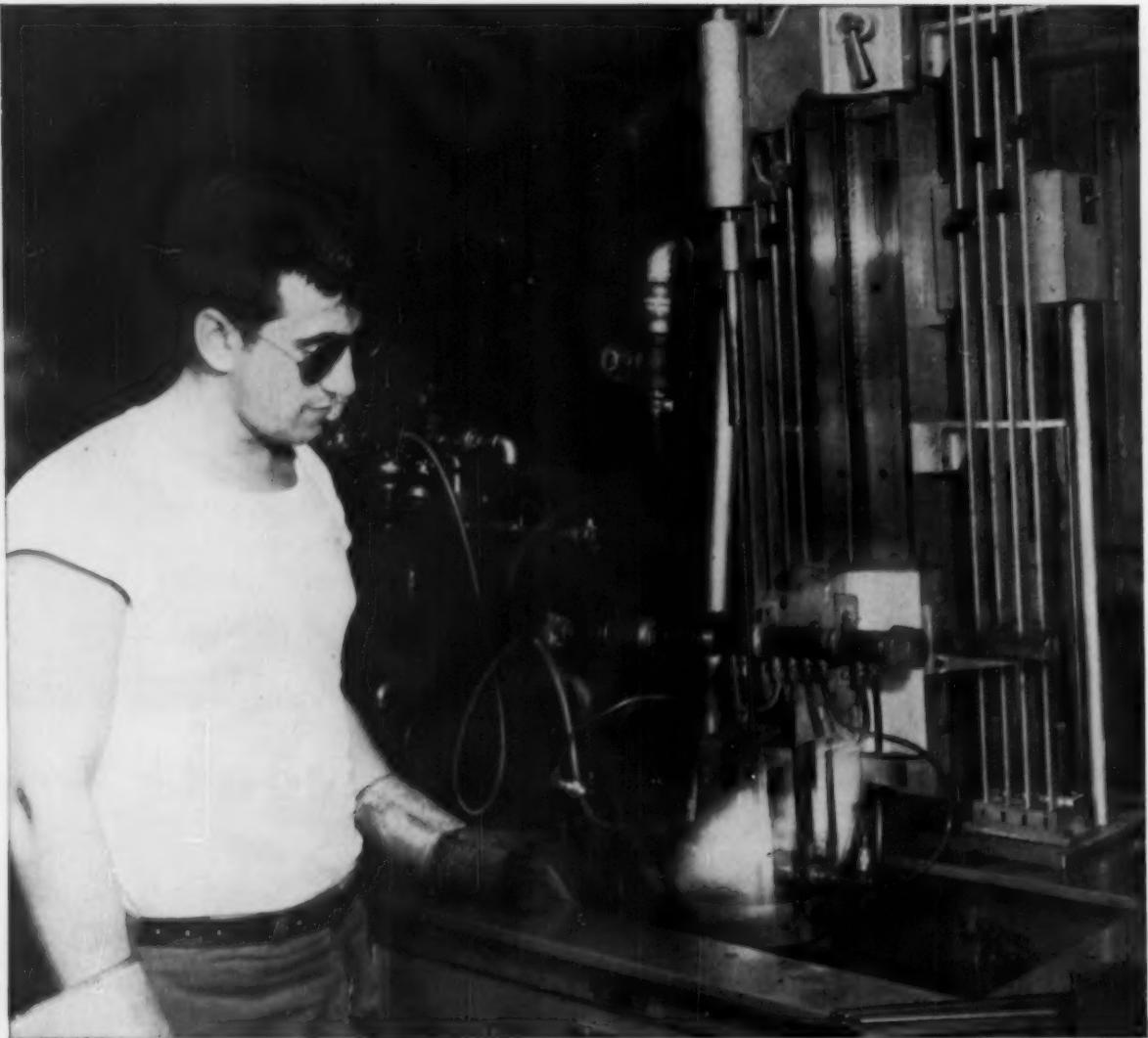


EXTRUSION PRESSES • DIE CASTING MACHINES
ROLLING MILL AUXILIARY EQUIPMENT

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Representatives in Other U.S. Cities and Foreign Countries

LAKE ERIE®



GAS - an adaptable tool for L R Heat Treating Co.

This is one of the many applications of Gas for special heat treating problems at L R Heat Treating Co., Newark, New Jersey. In this case, metal to be heat treated is held stationary while Gas burners move vertically along the length of the work. Sprays of water just below the flame area do the quenching.

Gas is the fuel used for heat treating at this modern plant. When asked to give their reasons for preferring Gas for heat treating, the staff at L R Heat Treating selected the following points as most important:

1. Very clean
2. Easy to control
3. Better combustion
4. Less equipment maintenance
5. No messy leaking connections
6. Easier to start up after shut-down
7. Dependable fuel supply
8. Excellent technical service supplied by the local utility

For further information on how Gas can help you in your heat treating operations, call your Gas Company Industrial Specialist. He'll be glad to discuss the economies and results Gas and modern Gas-fired industrial equipment can provide. *American Gas Association.*

Wire machinery designers can you use a free assistant?



USS AMERICAN MANUFACTURERS WIRE



AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS

TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

Designing a new wire fabricating machine is painful, hair-tearing work, and you probably would welcome all the help you can get.

For certain parts of the job, help is available from American Steel & Wire.

Consider the front end of the machine, where you actually load the wire. It pays to be sure that the machine will accept the most economical standard coils of wire.

We've found customers who have been ordering non-standard coils of wire for years, thinking all the while that they were standard. They had been paying a premium in price and time, due to the extra re-coiling time in the bundling room. And over the years, the wire handling facilities had grown so that it was a major operation to make use of standard coils of wire.

So when a new design is in the wind, call your American Steel & Wire representative and tell him what you are planning. He may think of something that will help.

AMERICAN MANUFACTURERS WIRE

AMERFINE—High quality fine wire.

AMERSPRING—music steel spring wire.

AMERLOY—alloy heading wire.

AMERTEMP—heavy-duty oil-tempered wire.

AMERHEAD—uniform heading wire.

AMERSTITCH—extra-tough metal stitching wire.

**More than
400
CECO-DROPS
(to be exact, 410)
in service
and being built
for 119 shops
all over
the world**

The piston-lift gravity drop hammer with short stroke control

CHAMBERSBURG

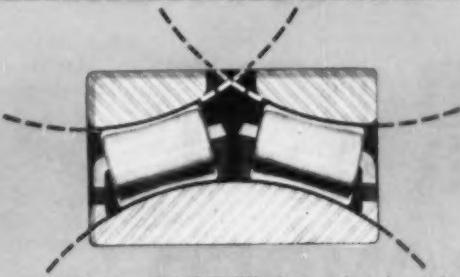
THE HAMMER BUILDERS

CHAMBERSBURG ENGINEERING CO.



CHAMBERSBURG, PENNSYLVANIA

These important bearing differences may spell longer machine life for you



FREE ROLLING—SELF-ALIGNING. Inner ring is truly spherical, free to align in any direction without affecting bearing capacity. Full load capacity is always assured despite shaft deflection or misalignment.

COLLAR SECURELY LOCKS INNER RING TO SHAFT. Tendency for collar to assume original circular shape reacts against the threads of the set-screws to maintain tightness. Use of set-screws in collar avoids distortion of inner ring.



Spring locking collar with two knurled cup-point set-screws secure bearing firmly to shaft.



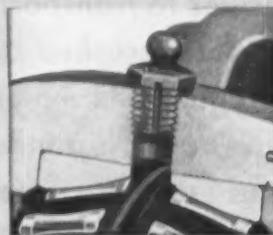
Contact Type Seals of felt laminated with synthetic rubber for extremely dirty conditions.



Labyrinth Seal for normal conditions.

EFFECTIVE SEALING. Contact Type Seals of felt laminated with synthetic rubber or Labyrinth Seals (see above cut-aways) keep grease in and dirt out.

EXCESSIVE GREASE PRESSURE PREVENTED. Lubrication fitting with pressure relief feature permits escape of excessive grease. Bearings are prelubricated and sealed at factory, ready for operation.



Series 400 roller bearings are part of industry's most complete line of ball and roller bearing blocks.

LINK-BELT

Ball and Roller Bearings

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarborough (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

13,712-AR

NEW SUPER RAYNILE CONVEYOR BELT 400% STRONGER

Provides the economical answer to transporting coal, ore, crushed stone and other bulk materials over long distances and up steep slopes.

This remarkable new Hewitt-Robins conveyor belt reinforced with the revolutionary synthetic fabric, Super Raynile, makes possible an entirely new concept in single-section conveyor application. It solves difficult materials handling problems where topography and other conditions require the use of a long single-length conveyor.

Already in service, Super Raynile has the highest operating tension of any conventional carcass belt. Because of its tremendous tensile strength, 400% greater than conventional cotton reinforced belts, a single conveyor section *5 3/4 miles long* can be built over level terrain to carry material at 400 TPH using

only a 6-ply Super Raynile belt 30 inches wide. This same belt can also lift material from ground level to a height of 830 feet.

The new Hewitt-Robins Super Raynile conveyor belt is highly flexible and pliable despite its great strength. Its cost is less than steel-reinforced belts and Super Raynile can easily be spliced in the field more quickly, more economically and without the specialized equipment required to splice steel-reinforced belts.

Super Raynile belt is available in a wide range of specifications . . . widths up to 72" — thickness up to 15 plies.

Learn more about this new long-length, long-life conveyor belt. Contact your local Hewitt-Robins Industrial Supply Distributor (see Classified Phone Book), or write direct to "Super Raynile Belt", Hewitt-Robins Incorporated, Stamford, Connecticut.

Hewitt-Robins



Conveyor Belting—Industrial Hose—Conveyor Machinery—Vibrating Screens—Vibrating Conveyors—Design, Manufacture, Engineering and Erection of Complete Bulk Materials Handling Systems.

HEWITT-ROBINS INCORPORATED • STAMFORD, CONNECTICUT

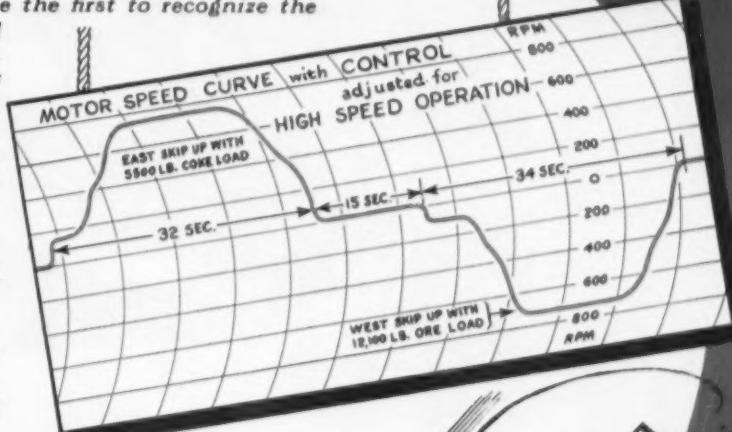
4 BIG ADVANTAGES IN SKIP HOIST OPERATION WITH EC&M LINE-ARC CONTACTOR CONTROL

1 Adjustable Control allowing up to double the running speed on the straight part of the track for reduced charging-time. Full field strength and maximum torque for acceleration, and at slowdown for accurate stopping—either with an empty bucket or capacity ore load. (EC&M were the first to recognize the advantages of adjustable field control to speed up the skip-hoist on the straight part of the track.)

2 Low Initial Investment—and low stand-by renewal part inventory.

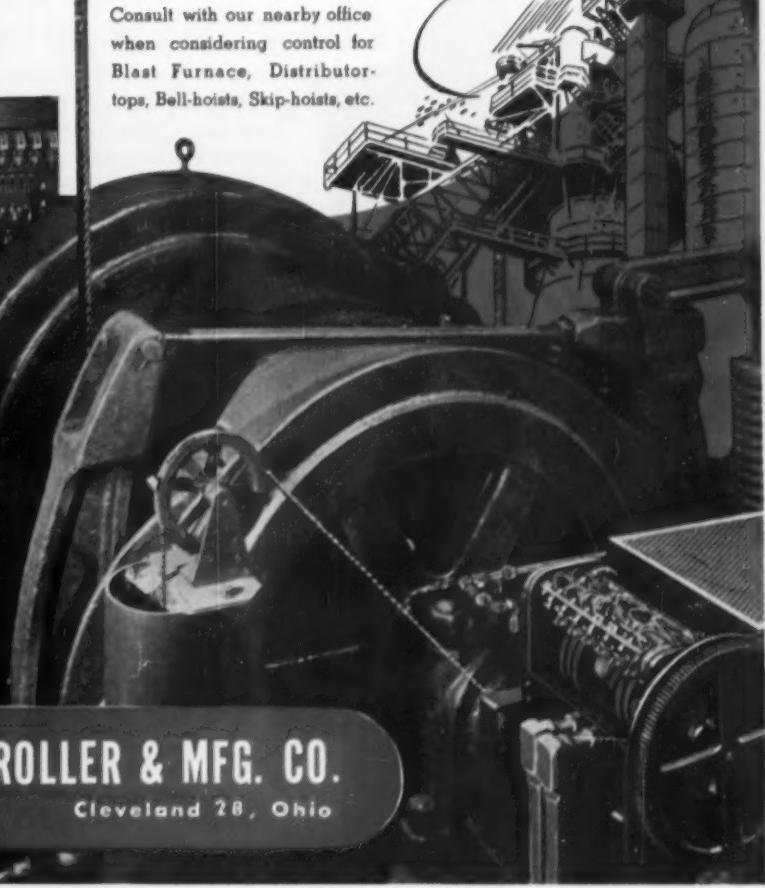
3 Simple Construction Easily Inspected—with minimum labor and up-keep expense.

4 Safe, Smooth Operation under all conditions of load. The accompanying curve shows this clearly and is typical of the economical, smooth and efficient operation obtained with this control.



Consult

Consult with our nearby office when considering control for Blast Furnace, Distributor-tops, Bell-hoists, Skip-hoists, etc.

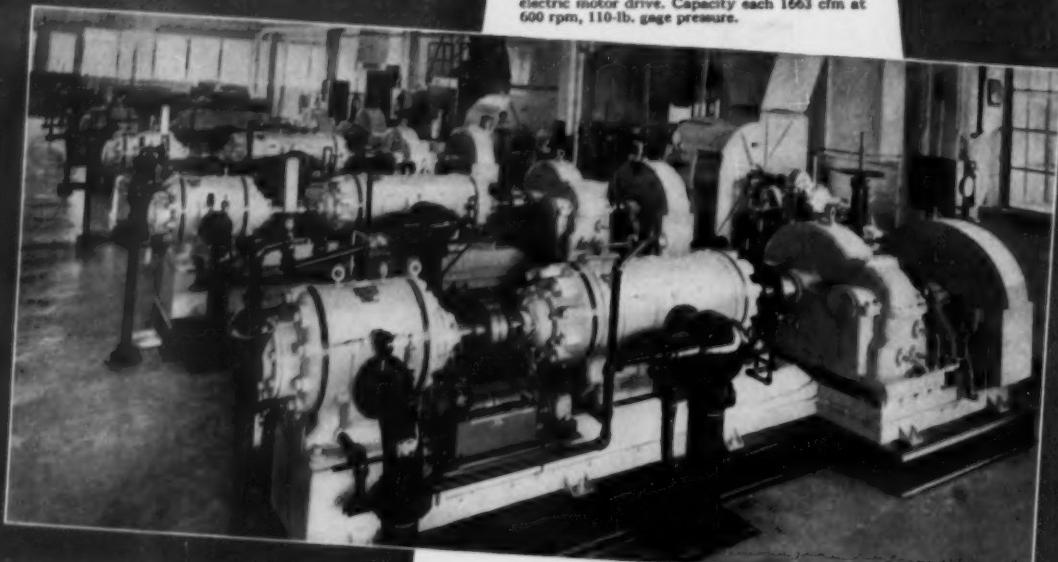


THE ELECTRIC CONTROLLER & MFG. CO.

4498 Lee Road

Cleveland 28, Ohio

Four C-300-300H Fuller Compressors, steam turbine drive. Capacity each 1248 to 1805 cfm with a corresponding speed range of 450 to 650 rpm; one 125 and three 110-lb. gage pressure. Two C-300-300H Fuller Compressors, electric motor drive. Capacity each 1663 cfm at 600 rpm, 110-lb. gage pressure.



PUTTING THE AIR IN AIRCRAFT

Aircraft companies use a lot of compressed air in the manufacture of airframes, engines, systems and components. The battery of six Fuller compressors pictured above meets one important aircraft facility's entire diversity of compressed air needs, efficiently and economically.

The key to Fuller's smoother operation is *rotary motion*, which provides large capacity in relation to size, simple direct drive from motor or internal combustion engine, minimum number of working parts, one-way air flow free from pulsation, lack of vibration, continuous service with minimum supervision and maintenance. Operation in cramped quarters or on ordinary flooring is simple and practicable.

Fuller Rotary Compressors are built for capacities to 3300 c.f.m., 125-lb. pressure. Write for Bulletin C-5A, illustrating and describing these machines.

C-274
1776

Fuller

. . . pioneers in harnessing AIR



FULLER COMPANY, Catasauqua, Pa.

GENERAL AMERICAN TRANSPORTATION CORPORATION SUBSIDIARY
Chicago • San Francisco • Los Angeles • Seattle • Birmingham



This hole means savings —instead of shavings

THE hole in the tube above should have been packed full of money. It would have been a quick way to show you some of the money you'll save when you switch to Timken® seamless steel tubing for your hollow parts jobs.

Because the hole's already there, you eliminate practically all of the scrap you have to drill out when you use bar stock—the steel you pay for but don't use.

Because the hole's already there, you can start with finish boring. You can make your hollow parts faster, with less equipment and fewer production steps.

Because the hole's already there, screw machine stations and men are available for other operations. You add machine capacity without adding machines. You use your employees more efficiently.

To make sure you get every penny's worth of steel for your dollar, our engineers will be glad to study your operation and recommend the most economical tube size for your hollow parts job—guaranteed to clean up to finish dimensions.

Timken seamless steel tubing gives you a better quality product, too. The piercing operation by which it's made is basically a forging operation. This gives the tubing a uniform spiral grain flow and a refined grain structure that brings out the best in the quality of the metal. And this quality is uniform from tube to tube and heat to heat because of the Timken Company's rigid quality control. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH



SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

December 15, 1955

**for your day-by-day
requirements**

RELIANCE
Job-Fitted
READY-TO-USE
SHEET and STRIP
STEEL

TO WISH YOU
MON TUES WED THURS FRI SAT
HEALTH &
ALL GOOD
FORTUNE
EACH DAY
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EASTERN PLANT, HAMDEN, CONN. .5Tate 7-5781
MIDWEST PLANT, CHICAGO 8, ILL. .CANal 6-2442

Reliance Customer Representative Offices

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RELIANCE *Job-Fitted* **PRODUCTS**

COLD ROLLED STRIP STEEL

Coils • Cut Lengths • All Tempers

SHEETS

Cold Rolled • Hot Rolled • H.R. Pickled
Galvanized • Long Terne
Standard or Production Sizes
Sheared or Slit to Actual Working Dimensions

It's no fun ducking orders when we'd rather pluck 'em

Trying to keep on top of mounting demand has been like climbing a greased pole for steel producers. In spite of near-capacity operations, deliveries have been falling behind.

Up to now our own delivery performance has been generally good. To try to keep it that way we are finding it necessary to allocate some products and modify delivery possibilities on others.

Such measures go against our grain. We realize the inconvenience they might work on some customers. But with many customers to think about, we can only do what's right in taking the best care possible of most of them.

To ease the situation, we're rounding out and expanding our steelmaking facilities and capacities, particularly at our Portsmouth, Ohio, plant. Your DSC Customer Representative will be the first to know when relief's in sight.

We'd appreciate it if you'd keep him informed of your requirements. He'll tell you honestly how we stand on our different products. Whenever and wherever we can be helpful, we'll do our very best.

Customer Satisfaction is our No. 1 Job



DETROIT STEEL CORPORATION

GENERAL SALES OFFICE—DETROIT 9, MICHIGAN

DSC CUSTOMER REPRESENTATIVE OFFICES

Charlotte, N. C., Chicago, Cincinnati, Columbus, O., Dayton, O., Detroit, Grand Rapids, Mich., Hamden (New Haven), Conn., Indianapolis, Jackson, Mich., Louisville, Ky., New York, St. Louis, Toledo, Worcester, Mass.

DSC MILL PRODUCTS

Hot Rolled and Cold Rolled Sheets	Flat Cold Rolled Carbon Spring Steel
Cold Rolled Carbon Steel Strip	Low and Medium Carbon Manufacturers' Wire
Low and Medium Carbon Manufacturers' Wire	High Carbon Specialty Wire
Aluminum Cable Strand Reinforcement	Rope Wire
Welded Wire Fabric	Tire Bead Wire

IN FURTHERANCE OF THE METAL STAMPING INDUSTRY



This Nine Page Technical Research and Standards Bulletin

→ "SOME TRADE PRACTICES AND TOLERANCES IN THE PRESSING METAL INDUSTRY"

Available to stamping buyers and sellers without charge

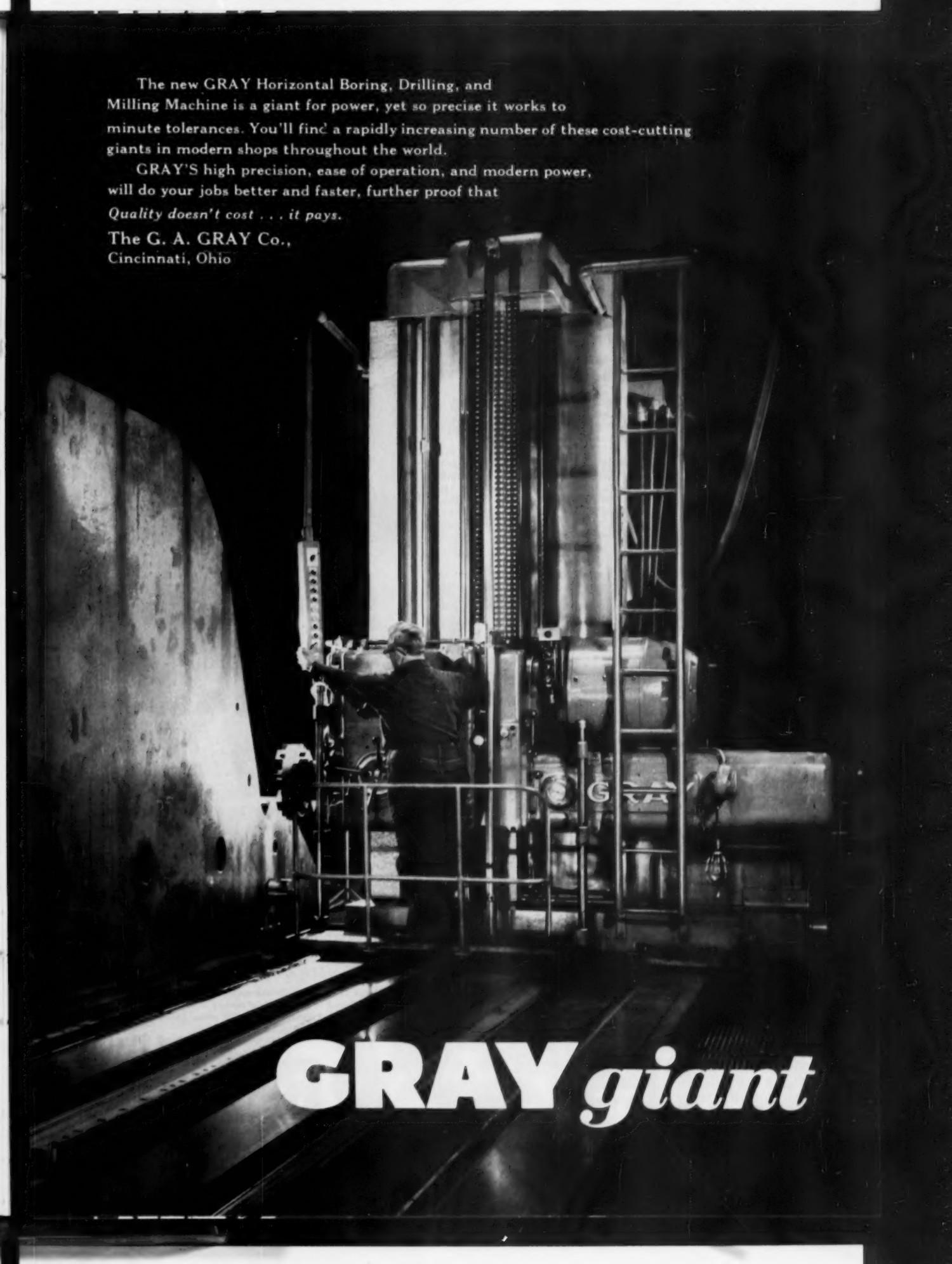
Please make request on your business letterhead to

PRESSED METAL INSTITUTE, 3673 Lee Road, Cleveland 20, Ohio

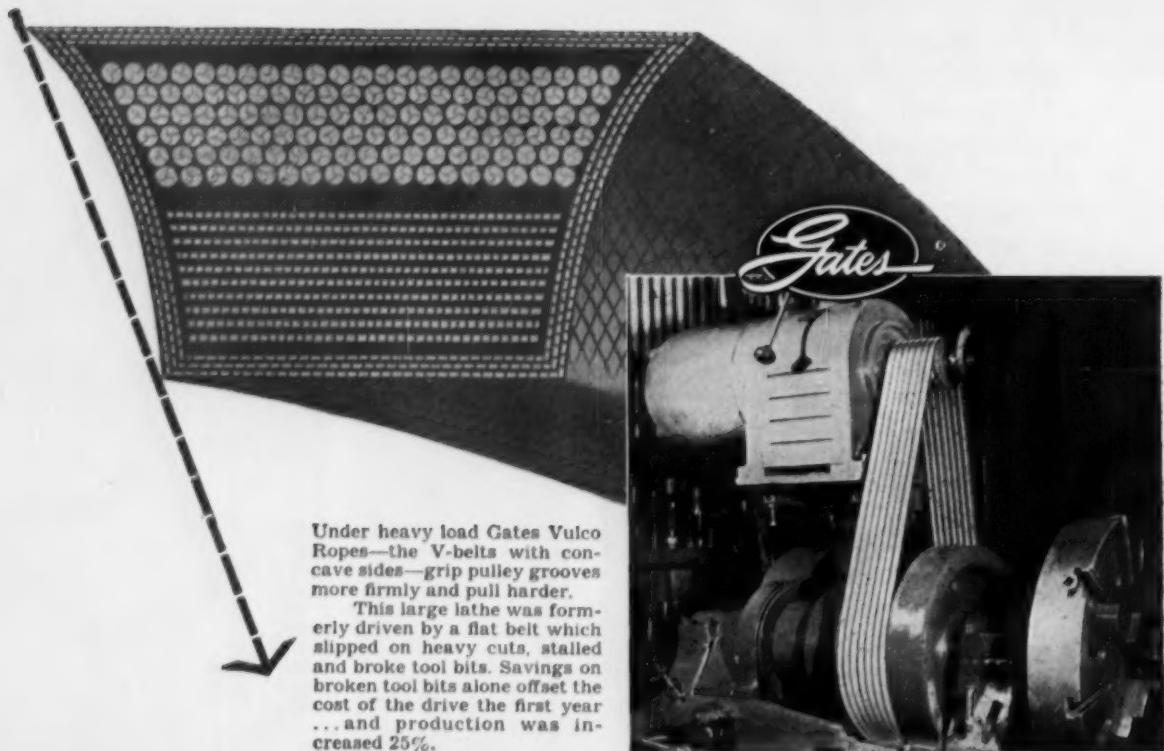
The new GRAY Horizontal Boring, Drilling, and Milling Machine is a giant for power, yet so precise it works to minute tolerances. You'll find a rapidly increasing number of these cost-cutting giants in modern shops throughout the world.

GRAY'S high precision, ease of operation, and modern power, will do your jobs better and faster, further proof that *Quality doesn't cost . . . it pays.*

The G. A. GRAY Co.,
Cincinnati, Ohio



GRAY giant



Under heavy load Gates Vulco Ropes—the V-belts with concave sides—grip pulley grooves more firmly and pull harder.

This large lathe was formerly driven by a flat belt which slipped on heavy cuts, stalled and broke tool bits. Savings on broken tool bits alone offset the cost of the drive the first year...and production was increased 25%.

Concave sides keep belt costs down!



Fig. 1

Industry is saving thousands and thousands of dollars every year by specifying Gates Vulco Ropes—the V-Belts with *concave sides* (U.S. Pat. No. 1813698).

Here's the interesting reason why Gates belts save money:

On the bend around the sheave the *precisely engineered* concave sides (Fig. 1) of the Gates belt fill out and become straight (Fig. 1-A).

Thus the belt makes uniform contact with the sides of the pulley. That means sure pulling power and even distribution of wear. Longer wear, fewer replacements cut belt costs...reduce down time...contribute to profits.



Fig. 1-A



Simple test proves value of concave sides

Bend a straight-sided belt (Fig. 2) and feel the sides *bulge out* around the bend. The bulging sides prevent the belt from fitting evenly in the pulley groove (Fig. 2-A). Uneven contact causes uneven wear...shortens belt life...increases costs.

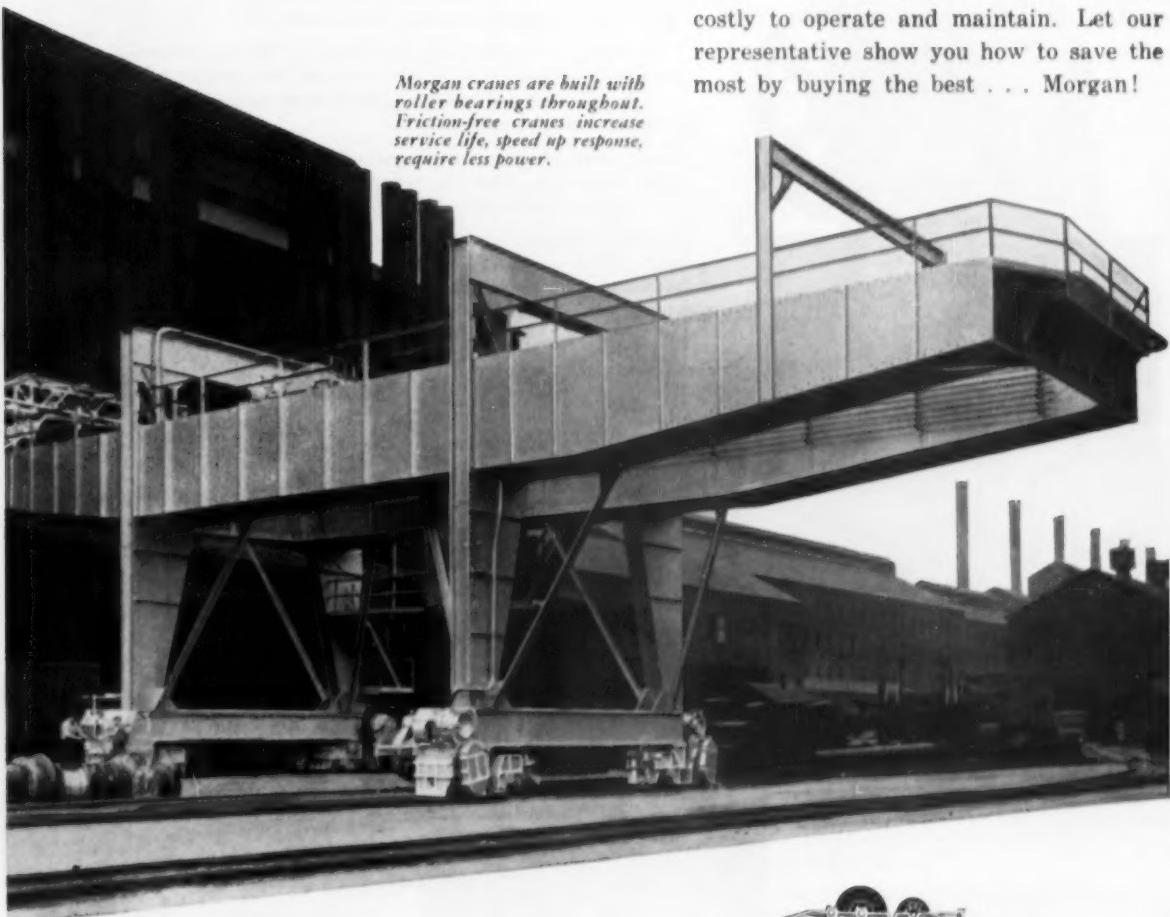
Keep belt costs down by specifying Gates Vulco Rope Drives—the V-Belt with *concave sides*. Belts you need are readily available from nearby distributor stocks. The Gates Rubber Company, Denver, Colorado—*World's Largest Maker of V-Belts*.

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

EPA 25-A

GATES DRIVES

How Morgan keeps cranes "rolling"



Morgan cranes are built with roller bearings throughout. Friction-free cranes increase service life, speed up response, require less power.

• MORGAN "Anti-Friction Engineering" keeps cranes rolling by providing precisely correct bearings and mountings for each specific application . . . your assurance of longer trouble-free operation, lower maintenance costs.

"Anti-Friction Engineering" is another vital link in the chain of features that makes Morgan cranes best in the business.

Performance records prove that advanced design and heavy duty construction of Morgan cranes make them less costly to operate and maintain. Let our representative show you how to save the most by buying the best . . . Morgan!



The Morgan Engineering Company, founded in 1868, manufactures overhead electric traveling cranes, gantry cranes, charging machines, plate mills, blooming mills, structural mills, shears, saws, and auxiliary equipment.

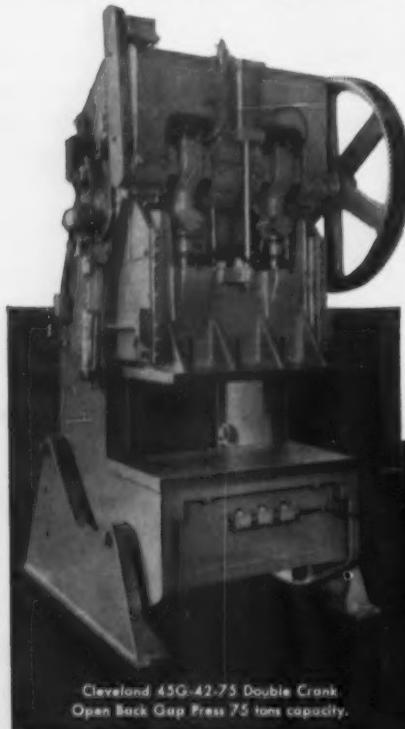
THE
MORGAN
ENGINEERING CO. *Alliance, Ohio*

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Cleveland 45G-42-75 Double Crank
Open Back Gap Press 75 tons capacity.

Cleveland 8K Knuckle Joint Press equipped
with conveyor type feed. 800 tons capacity.

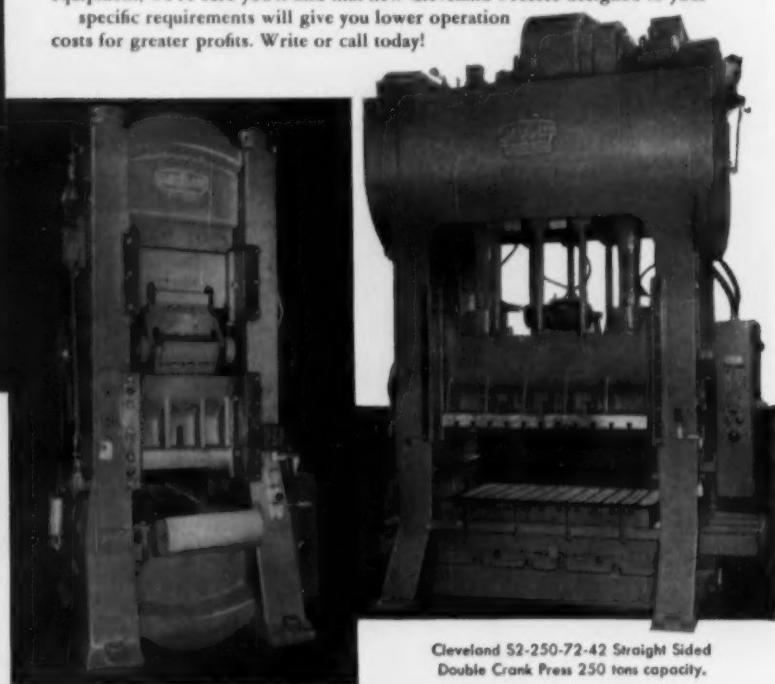
**"Why Settle For Less
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Here are three of our 11 specialized types of Cleveland Presses. Perhaps one of these may be your answer to greater stamping economy. If not, you can be sure that we can furnish you with just the right Cleveland for each of your particular needs.

Construction of every Cleveland is simple and powerful with built-in reserve capacity for added safety and lasting accuracy. Rugged frame construction and extra long slide bearing surfaces eliminate slide deflection assuring stamping accuracy.

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Cleveland S2-250-72-42 Straight Sided
Double Crank Press 250 tons capacity.



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CITY FOUNDRY DIVISION • SMALL TOOL DEPARTMENT



You can set a new High-Torque Unbrako self-locking socket set screw and forget it—it stays tight



There are several reasons: the deeper socket which gives you better purchase with the wrench; the rounded socket corners which eliminate the sharp corners where cracks start; the special methods of heat treatment in atmosphere-controlled furnaces; the development of fully formed threads.

*Up to 40% higher
tightening torque—
a new Unbrako feature*

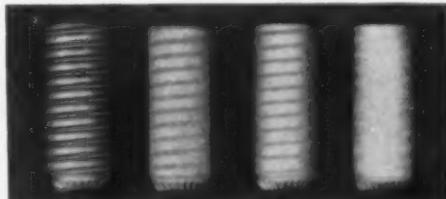
RECOMMENDED SOCKET SET SCREW TIGHTENING TORQUES (Inch-Pounds)

SCREW SIZE	UNBRAKO	SET SCREW B	SET SCREW C	MINIMUM DIFFERENTIAL %
#4	5	3.9	3.5	28
#5	9	7.8	7.4	15
#6	9	7.8	7.4	15
#8	20	14.7	14.5	36
#10	33	26.5	25	25
1/4	87	62	60	40
5/16	165	122	125	32
3/8	290	198	225	29
7/16	430	309	350	23
1/2	620	460	500	24
5/8	1225	1106	1060	11
3/4	2125	1540	1800	18
7/8	5000	3660	4600	9
1	7000	5025	6500	8

These microphotographs illustrate just what fully formed threads do for the new High-Torque UNBRAKO. They make the whole screw stronger. The metal is compressed into the closely knit grain structure that you see. The grain flow follows the contour of the threads. There are no straight lines along which shear can occur. The UNBRAKO retains its flow lines even when ground down to .010" below root diameter. Screws with cut or ground threads lose thread form at root diameter.

You can't buy a better set screw than an UNBRAKO. See your authorized industrial distributor today. Or write STANDARD PRESSED STEEL Co., Jenkintown 17, Pa.

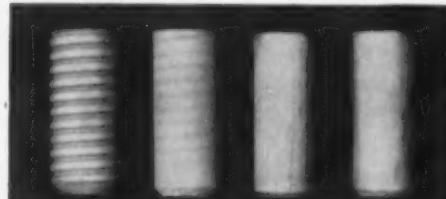
Unbrako Set Screw



Pitch diameter Root diameter .005" below .010" below
root diameter root diameter

Fully formed threads make the whole screw stronger. The metal is compressed into a closely knit grain structure. The grain flow follows the contour of the threads. The UNBRAKO retains its flow lines even when ground down to .010" below root diameter. Screws with cut or ground threads lose thread form at root diameter.

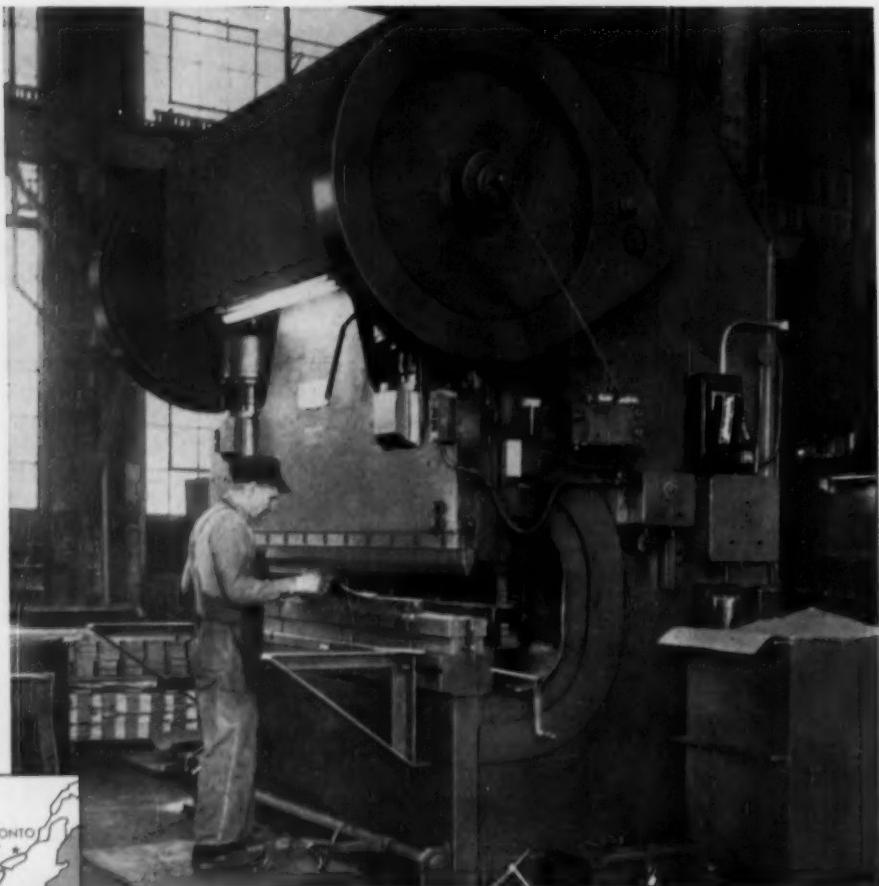
Ordinary Set Screw



Pitch diameter Root diameter .005" below .010" below
root diameter root diameter

ALL UNBRAKOs can withstand higher tightening torques than ordinary set screws. For example, the recommended torque for a 1/4" UNBRAKO is 87 inch-pounds—40% greater than that recommended for an ordinary set screw.

STANDARD PRESSED STEEL CO.
UNBRAKO SOCKET SCREW DIVISION **SPS**
JENKINTOWN PENNSYLVANIA



Installed in the Chicago plant in 1948, this 260 ton capacity machine, Model J4 1/2-6, forms the smaller and lighter gauge conveyor panels. Illustrated is a curved section being formed of $\frac{1}{8}$ " plate to a radius of 8".



STEELWELDS Serve Link-Belt Plants From Coast-To-Coast

NINE LINK-BELT Company plants located from California to Pennsylvania, Texas to Ontario, Canada, and in Transvaal, South Africa, have one to six Steelweld Presses and Shears. Nearly every year since 1944 more Steelwelds have been purchased. Slightly over half of the machines are shears.

As a large manufacturer of a wide variety of conveying and processing equipment such as apron, screw, oscillating and overhead chain trolley conveyors, railroad car dumpers, bucket elevators and other handling equipment, Link-Belt

plants must shear and form a great amount of steel plate. From experience, Link-Belt has learned that Steelwelds are outstanding for this work.

There are several reasons for this. For instance, the accessibility of controls and ease of making adjustments. The all-around solid construction that permits continuous operation with hairline accuracy. The heavy, well designed machinery which requires minimum maintenance.

Like Link-Belt, when you really get to know Steelweld Bending Presses, you, too, will be elated with their performance.

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CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.



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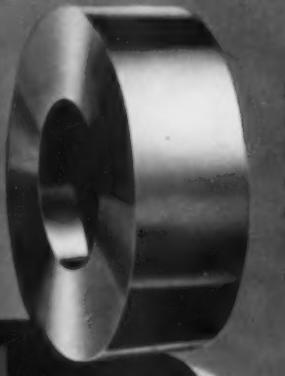
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CORPORATION

CARNEGIE, PENNSYLVANIA

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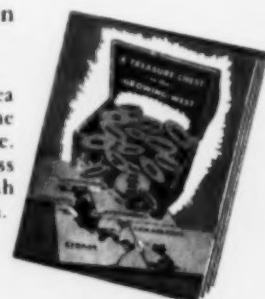


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- 214 different minerals.
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- Largest proved uranium reserves in the nation.
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Ask for copy of "A Treasure Chest in the Growing West"

Detailed information is presented in this Area Resource Brochure. Write, wire or telephone for a copy. Inquiries held in strict confidence. Address: W. A. Huckins, Manager, Business Development Department, Dept. 18, Utah Power & Light Co., Salt Lake City 10, Utah.



UTAH POWER & LIGHT CO.
A Growing Company in a Growing West

CARNEGIE, PENNSYLVANIA

50 Years
of Progress

50

VANADILM CORPORATION OF AMERICA



Since the discovery of Mina Ragra fifty years ago — the world's richest vanadium mine — we have been absorbed in one of the most fascinating occupations in industry: the development and production of ferro alloys, metals and chemicals. Working closely with the metals and chemical industries and other progress builders, we contributed to many of the engineering achievements of our day: jets . . . automobiles . . . machine tools . . . mining, construction and agricultural machinery and scores of other products that range from sleek, swift streamliners to tough, heavy-duty synthetic fibers.

We were privileged to take part in these and numerous other developments in the past half century, for their success depended in part on the ferro alloys, metals and chemicals which VCA helped pioneer and produce. Now . . . on the occasion of our fifty years of service to the Metals Industry, we look ahead to . . .



THE NEXT FIFTY YEARS . . .

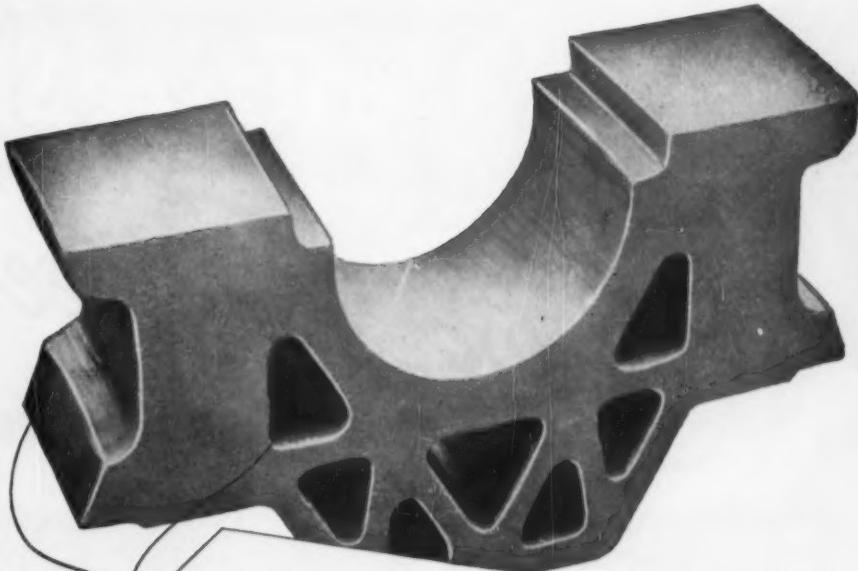
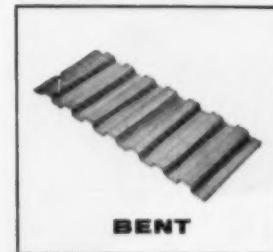
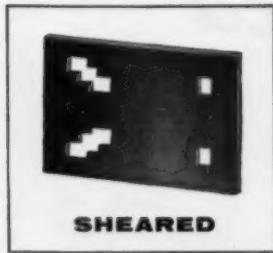
To assure a steady, continuous supply of raw materials, we have expanded our mining operations. We have enlarged and modernized our milling and smelting operations. We have recently built two new plants. And plans are now under way for the construction of a third, designed to meet the ever-increasing need for Vancoram ferro alloys. We have built a new Research Center — one of the finest of its kind to be found anywhere — for the important work of developing new and improved Vancoram products and assisting customers in the solution of their alloy problems.

Looking ahead to the next fifty years, there will be a need to develop special alloys, metals and chemicals to meet the requirements of the jet and atomic age. Our Research Center is already at work on these and other important problems in every phase of our technology. All this to achieve a goal: to serve the Metals Industry better than we have ever served it before.



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**STEEL PLATE SHAPES SERVICE
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You can cut production costs—save from 5% to 25% on components—by using By-Products Steel Co.'s Steel Plate Shapes Service to pre-form your parts.

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FOR YOUR SHEARING NEEDS

This outsize plate shear was designed and built by Thomas for production shearing of armor-plate up to 2" x 14' 0"



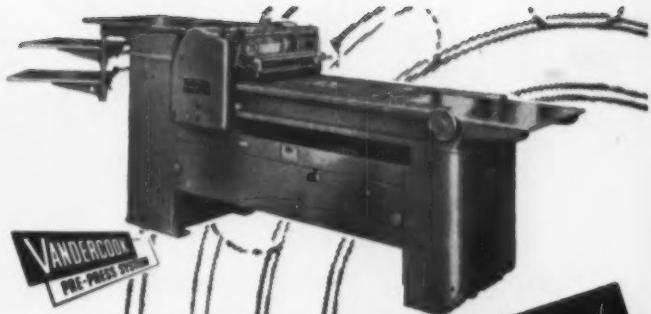
Thomas Heavy Duty Shears are designed for your specific shearing requirements. You'll find them throughout the world's major plants, cutting not only armor-plate but aluminum, copper, stainless, tool and ordinary steel.

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We'd like to work with you in helping solve your shearing problems. Our engineers are available for consultation on call . . . without obligation, of course.

The trend is to THOMAS in Punches • Shears • Presses • Spacing Tables • Benders

Color printing demands exacting precision, vibration-free press performance for accurate register of one color to the next. You'll find Federal Bearings here, too.



High operating speeds... heavy, suddenly applied radial and thrust loads... little maintenance or none at all—they're all part of the service conditions Federal Ball Bearings meet in power hand tools.

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In hobbyists' tools and home appliances—in pressrooms and mass-production plants—in farm equipment and business machines—you'll find Federal Ball Bearings quietly and efficiently at work, in some of the hundreds of types and 12,000 sizes that the company has been producing for almost 50 years devoted *only* to making ball bearings.

When Federal Ball Bearings are a part of so many things you use, shouldn't they be a part of the things you make?

THE FEDERAL BEARINGS CO., INC. • POUGHKEEPSIE, N. Y.

175 fact-packed pages of information on ball bearings are yours for the asking in Federal's Catalog. Just drop us a line for your copy.

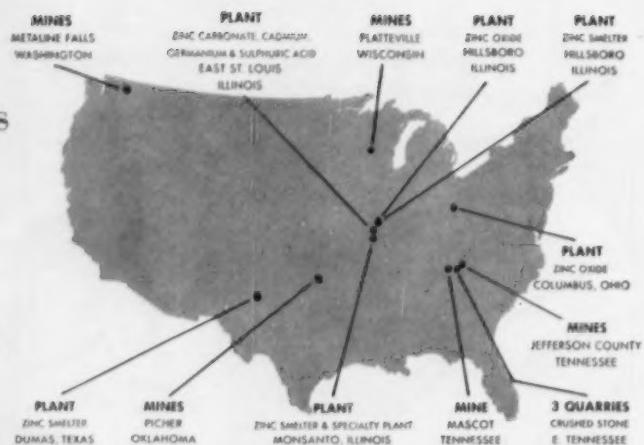


Federal BALL BEARINGS

One of America's Largest Ball Bearing Manufacturers

American Zinc and its products

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- LEAD-FREE and LEADED ZINC OXIDES
- ZINC CARBONATE
- GERMANIUM DIOXIDE
- AGRICULTURAL LIMESTONE
- CRUSHED STONE

One of the key factors in American Zinc's widespread mining and milling operations is Tennessee. American Zinc also owns and operates mines in Jefferson County. It is here that one of the largest known reserves of zinc in the United States is found (in excess of 1,250,000 tons of recoverable zinc, proven, with additional large reserves indicated). Other company-owned and operated mining properties are located at Platteville District, Southern Wisconsin, Metaline Falls District, Eastern Washington; and Picher field of the Tri-State Area (Missouri-Kansas-Oklahoma). For the complete picture, see map above.

**American
Zinc sales
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AMERICAN ZINC, LEAD & SMELTING COMPANY

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The Iron Age Newsfront

Central Plant To Sinter Ore

A major steel company is contemplating a huge ore sintering plant which would serve several of its mills in a relatively compact area. All ore would be shipped directly to the sintering area, and after beneficiation routed to the various mills.

Engineering Brains In Short Supply

Engineering manpower specialists have come to the reluctant conclusion that industry must learn to live with a short supply of engineers. Programs now in the works will help, but the rapidly increasing needs for engineers will continue to outstrip the supply for some time to come. For one thing, there just aren't enough minds of the right type becoming available even if all qualified students could be guaranteed an engineering education.

Riveting Machine "Plays The Tune"

A roll of glass cloth marked with a pattern of accurately placed black dots "calls the tune" for an automatic riveting machine in much the same manner as a roll in a player piano. As the roll turns, an electronic eye scans it and "orders" the machine to follow the pattern. Riveting is speeded considerably and results are much more uniform.

Consumable Electrode Makes A Hit

A new consumable electrode melting process, combining both arc and vacuum melting techniques, has been met with unprecedented interest from industry. Some of this may tie in with the growing interest in the general field of vacuum metallurgy, but the process itself is strong on selling points and can claim most of the credit.

Pig Iron Prices To Climb

Look for pig iron prices to rise sometime during the first quarter of next year. The boost may come before the predicted hike in steel prices. The last general rise was in July of this year when most pig iron grades advanced about \$2.50 per ton.

Potential For Computers Grows

The potential for computers in industrial process control is so great that its effect has been to prompt a rash of mergers and working partnerships between computer and instrument firms. Object: To combine computer capabilities with instrument firms' experience and equipment for detecting, measuring and converting process variables into digestible computer terms.

Look For Steel On "Easy Terms"

Top steel executives of a leading steel firm are seriously considering the possibilities of selling steel on the installment plan. It would amount to advancing money to customers to buy steel in slack times and thus maintain some sort of normal inventory level.

Producers Have Reason For Worry

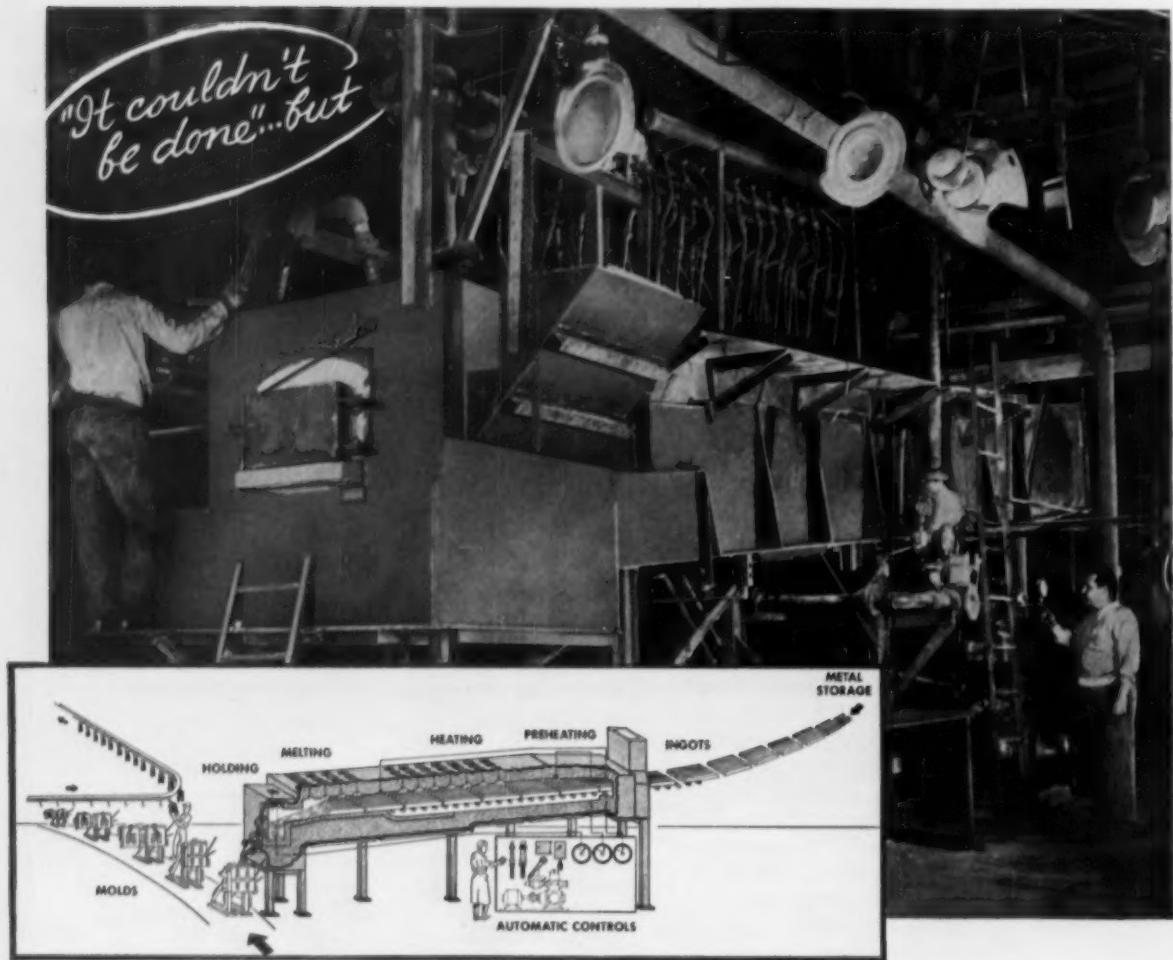
Despite reports of increasing inventories of consumer goods, a number of major producers of finished items are still worried. A fresh crop of slowdowns in production due to steel shortages has upset plans to build inventories for the spring selling season.

Workmen's Compensation Cost May Spiral

Cost to business, if the states go along with a U. S. Labor Department proposed "model" workmen's compensation law, would be tremendous—far in excess of costs of minimum wage law. Labor Department will push the proposal which materially broadens the definition of on-the-job injury.

More On Computers

Still more evidence of the versatility of computers comes to light. Grinding wheel formulas, including proportions of abrasives, grain concentration and every increment in grinding wheel hardness, are coughed out by a computer at 1½-hour intervals. Previously, the same calculations required thousands of man-hours.



Cold Ingot To Molten Aluminum In 24 Minutes; Melting Costs Cut 33%

Selas Gradiation Heating is overcoming inefficiencies characteristic of batch melting . . . in this first, in-line automatic unit for continuous melting of aluminum . . . in the permanent mold foundry at Monarch Aluminum Mfg. Company, Cleveland.

35-60 pound ingots are automatically conveyed into one end . . . melt and flow into a holding pot—or into the mold itself—at the other. New economies, more production and improved working conditions are achieved from such operating benefits as these:

- Molten metal reserve reduced by more than 90%.
- Shorter cycles: liquefies ingots in 24 minutes; pre-heating takes only three hours instead of 22.
- Furnace retains efficiency at partial capacity.

- One-third reduction in fuel consumption . . . to 1.1 cu. ft. of gas per pound of melt.
- Smaller furnace . . . gives more work area in casting room.
- Comfortable melting-room temperature all year around.
- Closer quality control. Reproducibly-uniform castings.

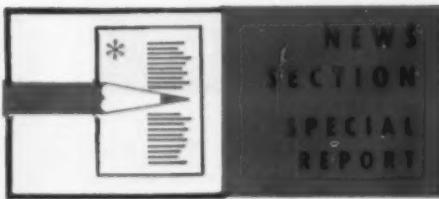
The Gradiation heating method noted above is also being successfully applied to the continuous melting of other non-ferrous metals.

Write for complete information on the Monarch continuous melting operation.



SELAS

CORPORATION OF AMERICA
PHILADELPHIA 34, PENNA.



Can You Beat Skilled Labor Shortage?

Industry's need for top-flight craftsmen is approaching the World War II barrel-scraping days . . . Key metalworking areas find skilled workers hard to come by . . . Problem is long-range.

• HOW SERIOUS is the skilled labor shortage and what can you do about it?

An IRON AGE check of leading metalworking areas shows that a first class tool and die maker is as hard to find as the proverbial needle in a haystack. Industry's need for top-flight craftsmen is approaching the World War II barrel-scraping days.

Along both seaboards and at such inland points as Detroit and Chicago, a critical shortage of skilled workers is shaping up. The reason: record prosperity and resultant heavy demand for the skilled worker.

Machinery producers, automobile makers, foundries, and aircraft are among those feeling the pinch most. They'll be bidding up the price of skilled labor in the months ahead.

Fewer Surplus Areas

The nationwide labor manhunt is cutting down the number of labor surplus areas. The government recently dropped seven more cities from its "surplus" classification. These include Pittsburgh, Philadelphia, Knoxville, Fall River, Mass., and Utica-Rome, N. Y.

The new ruling means that industries in these areas are no longer eligible for preferential awarding of government contracts, special consideration on fast tax amortization, or priority in government buying. The action reduces the number of labor surplus areas to 19, lowest in two years.

In Philadelphia, the Budd Co. has a search on for 174 skilled

tool and die men. It feels it will get about half this number. The company is upgrading jobs wherever possible, is stepping up its training programs, and working longer hours.

Budd has about 100 apprentices in training throughout the year. This doesn't mean that it is ahead on its skilled labor needs. Apprentice training is a long-haul proposition. Each job has its own quality standards. Training a first class man takes four years.

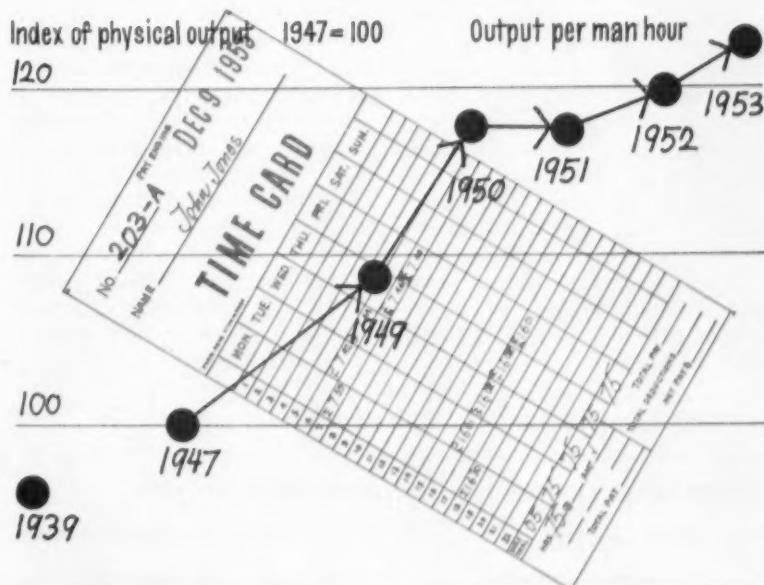
The big problem, says a smaller

firm, is to hold a man while he's going through basic training.

Says a supervisor, "A fellow with limited ambition knows he can make around \$2 an hour today without going through several years' apprenticeship. We have plenty of apprentice applicants, but what we need right now is more first class workers."

Nowadays, a foreman notes, a skilled worker drawing around \$3 an hour is often called on to do a job normally performed by a \$1.50 an hour semi-skilled worker.

Climb in Worker Output



STEADY CLIMB in worker output may be answer to skilled labor shortage, but still poses problem of skills required to man and maintain highly automatic equipment. Problem is universal in most industries.

This, he points out, slows down production, boosts costs, causes dissension among first class workers.

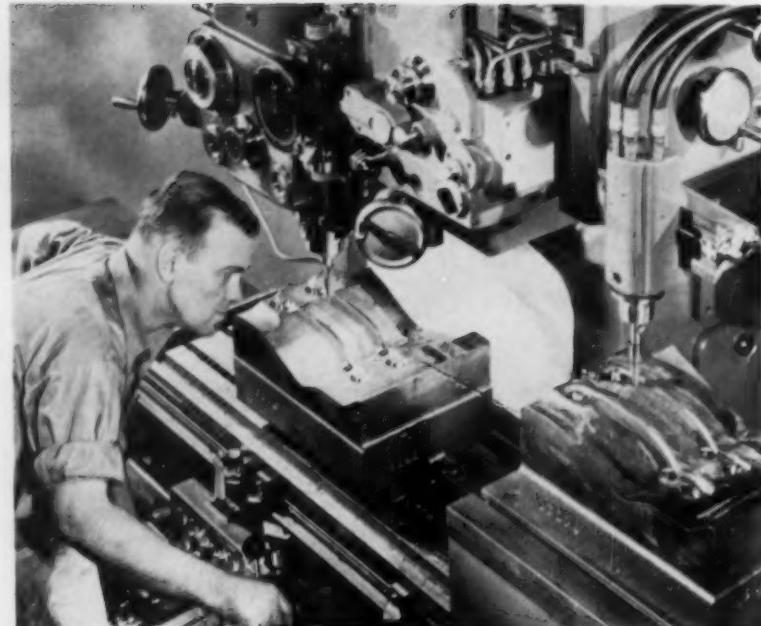
Work Hours Up

Many firms which can't find additional skilled labor are forced to work present staffs longer hours. This pushes up overtime. In October, the average production worker put in 41 hours a week, highest since December, 1952. Average weekly plant earnings hit a new high of around \$78.

It's estimated there are about 9 million skilled workers scattered throughout industry. Metalworking's ranks include machinists, machine repairmen, tool and die makers, maintenance mechanics, die model builders, foundry pattern makers, and draftsmen. Some of these craftsmen are working a 60 hour week.

Many larger metalworking industries such as automotive, some foundries, and a scattering of tool manufacturers, are resorting to short-term expediences to remedy skilled worker shortages. Automakers have year 'round out-of-area recruitment programs. In Chicago, some aircraft plants are recruiting skilled Canadian labor.

Other plants are eyeing older workers. Employers who once balked at hiring men over 50 are now sending out applications blanks minus age limitations. There are still some skilled machinists and maintenance men around in the higher age brackets. Some firms are reaching into



SKILLED workers like this are hard to find—and there is competition.

the South to bolster their skilled worker forces. So far, these short-term measures haven't met with much success.

Most areas find semi-skilled workers more available. Seasonal slowdowns in the building trades have supplied some relief. The supply, however, is strictly temporary. Unskilled labor is easiest to find. But even here there can be some headaches. In Chicago, for instance, some plants are employing substantial numbers of Puerto Rican workers. This poses a tough language problem for supervisory personnel since the majority of new hands speaks little English.

Some cities have it easier. In Pittsburgh, most plants don't have much of a problem finding unskilled workers at the moment.

With the Westinghouse strike, there's even a surplus in this category.

What Can You Do?

Many labor experts and employers think the skilled labor shortage will be a continuing problem. As automation becomes more widespread, there will be need for greater technical skills. Many firms are broadening their training programs, are making the training period more attractive salarywise and incentivewise. Some are cutting a four-year apprenticeship stint to three years or less and still covering the same amount of ground through updating instructional techniques.

Others are working closely with public and private schools specializing in vocational courses. Lots of calls for assistance are reaching the Federal Bureau of Apprenticeship in Washington.

A major auto producer recently got the United Auto Workers to agree to a contract change allowing the company to train one apprentice for each five journeymen who've already completed the basic course. The previous ratio was one apprentice for each 10 journeymen.

What Can You Do About It?

SHORT TERM ACTION

- 1. More overtime
- 2. Upgrade skills where possible
- 3. Shorten apprenticeship
- 4. Out-of-area recruiting

LONG TERM ACTION

- 1. Broaden training programs
- 2. Make apprenticeship attractive dollarwise, incentivewise
- 3. Check vocational schools

VACUUM METALS: Baby Is Growing Up

Vacuum Metals Corp. pours first heat from big 2200 lb furnace to open new outlets . . . Further expansion seen . . . High cost factor offset by better performance . . . Applications growing—By J. B. Delaney.

♦ AVAILABILITY of vacuum-melted metals in ingots up to 2200 lb opens up new applications for this high-purity material and sets the stage for still further strides by this growing industry.

Even as Vacuum Metals Corp. was demonstrating its 2200-lb induction melting furnace at Syracuse, N. Y., the company had one eye cocked on further expansion to meet expected heavier demands from military and civilian customers. Vacuum Metals is jointly owned by Crucible Steel Co. and National Research Corp.

Significantly, the new furnace produced a marketable heat of 52100 grade in its first test, indicating that company metallurgists and technicians under the direction of James H. Moore, general manager, had profited by experience with two smaller furnaces of 300 and 600 lb capacity, respectively.

The smaller furnaces are still in production, alongside their bigger sister unit at the site of Crucible's Sanderson-Halcomb Works in Syracuse. The vacuum melt shop is laid out to facilitate addition of other, probably bigger furnaces, when necessary.

The Cost Factor

Heavier and larger ingots will make possible the application of vacuum-melted steel and alloys to jet engine turbine wheels, landing gear components, and other uses which require heavier sections. VMC also foresees aircraft structural members fabricated from high-purity metal. This is in addition to such present applications as jet engine buckets and main thrust bearings.

At present, vacuum-melted metals are going largely into applications where cost is not a factor.

Where an air-melted 52100 grade sells for 20-25¢ per lb, the same grade vacuum-melted costs the consumer \$2.10-2.25 per lb. But, as Mr. Moore pointed out, the cost differential is not so large as it seems when all factors are considered. For example, a ball bearing manufacturer has found that by using vacuum-melted material his rejects for a critical application have been reduced from 15 pct to a fraction of 1 pct. VMC thus feels it has a good chance to move into applications where economics are important.

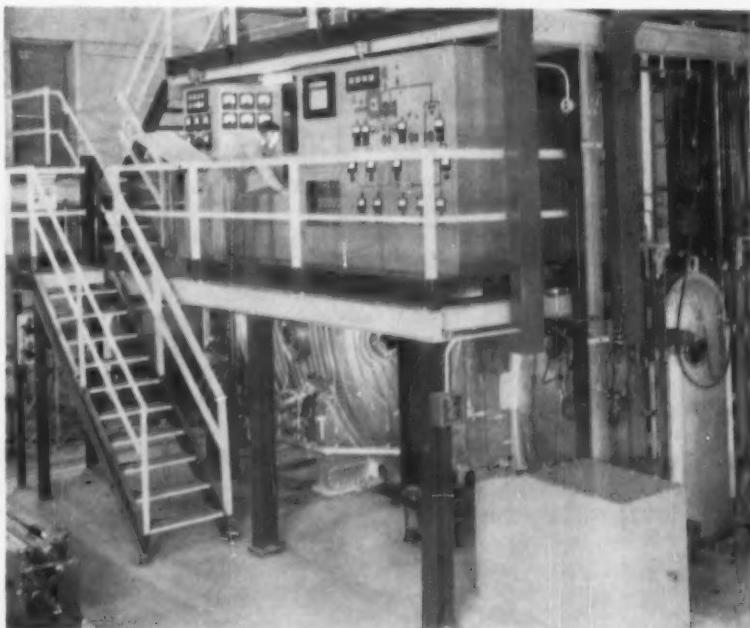
In addition to aircraft, VMC can point to applications and potential applications in automotive, electronics, bearing, nuclear energy, and tool steel. Applications

in cutting tools are still in the experimental stage, but a possible use in this field is fine drills, where fatigue is an important factor.

Boosts Supply

The new VMC furnace adds 60 to 75 tons to the monthly potential supply of vacuum-melted metal for industry. It was built by the Equipment Div. of National Research and installed by Sanderson-Halcomb Works engineers.

VMC says it is the first commercial producer and the first fully integrated producer of vacuum-melted alloys and metals in the U. S. National Research produced the first samples of vacuum-melted metals in its laboratories more than 10 years ago.



MORE vacuum-melted metals for industry. Vacuum Metals Corp. has brought this new 2200-lb induction melting furnace into production to supply growing needs of military and civilian consumers. Outlook is good.

QUENCHING: Salt Bath Trend Climbs

Although not a major factor, use of salt bath quench in heat treating gains . . . Users find higher cost pays off for some applications . . . Number of installations will increase in 1956—By K. W. Bennett.

• YOU'LL SQUINT to spot the trend, but salt bath quenches for heat treated steel are gaining ground. They did it in 1955. They'll make substantially stronger gains in 1956. Here's why:

A farm implement manufacturer will begin advertising a set of gears that will outwear the rest of the tractor they power. Secret of the multiplied gear life (up as much as 350 pct) is reduced distortion through the use of a high temperature quench in his heat treating operation. The gears are no harder and no tougher than in the past. But minute distortions and stresses that stepped up wear are eliminated.

A lawnmower producer is salt bath hardening 90 pct of the fixed blades in his product for the same reason. The product range extends from tractor gears and aircraft splines to putty knives, television parts, outboard motor parts, automotive castings, dies, forgings, ball bearing races, 90 mm shells, to parts over 2000 lbs in weight.

Rapid Growth

Isothermal annealing and hardening, including austempering and martempering, are not new. Their rapid growth in the heat treating of production run parts is. Next year, one new alloy steel, a chrome-moly-vanadium combination, will be martempered in a salt bath line built for this one particular product. The raw material range handled by the new lines will include high, low, and medium carbon steels, and ductile iron may be in by the end of the year. An automotive plant plans to use a 900°F salt bath to stress relieve casting while washing away fine core sand particles in the same operation.

Views on proper techniques for the use of salt quenches range from

those who regard their method as a prized trade secret to those who'll start swinging when told a salt bath is worth its salt. Their argument: oil quenching at up to 300°F or even 400°F is not only more economic, but results can be as good. This despite the old rule of thumb that a quenching oil doubles its rate of oxidation every 20° over 120°F. (Though quenching oils are available for operating temperatures as high as 600°F.) The proof is in the spending. Even the hardest oil quench adherents admit the number of salt bath installations is increasing and that 1956 will see a rash of new installations.

Though most new marquenching, austempering, or isothermal annealing installations are in captive heat treat shops, a sprinkling of jobbers is boosting their salt

quench-and-heat capacity. Sunset Steel Treating at Los Angeles subsidiary of Modern Steel Treating, is winding up a \$100,000 installation and is still growing. The local market is the West Coast aircraft industry, but aircraft plants everywhere are increasingly a strong market for isothermal hardened steel for production parts.

Isothermal annealing as a branch of the large job forging shops is already well entrenched and is in for a boost. In Chicago, at least three major forge shops are expanding isothermal annealing and hardening lines as are three major captive heat treating lines. Kropp Forge will install a line using salt bath with heating furnaces in which the low temperature pot will begin at 400°F to a probable top range of 750°F.

Electronics:

General purpose units aimed at small and medium industry

Electronic computers, the "electronic brains" that five years ago were regarded as useful to only a handful of major corporations, are aiming for a market in medium and smaller plants this year. This was the word at the second automation exposition in Chicago.

Producers of computing equipment are carefully underlining the fact that the units are easy to operate, low in cost, and simple to maintain.

Performance, considering the repeated emphasis on low cost, is impressive. One computer, handling 500 operations per second, requires only 15 cu ft of cabinet space, mounts 100 vacuum tubes

and 1200 germanium diode crystals, has a magnetic drum vocabulary of 4,096 words, and can handle large scale engineering problems.

These smaller computers are listed as "general-purpose." One model produces answers typed on paper, punched on paper tape, punched on IBM cards, or recorded on magnetic tape. And if management needs a chart in a rush, the computer can draw that, too.

In the plant office or out on the production line, the growth of mechanization of industrial processing is evidenced in sales figures. The Scientific Apparatus Manufacturers' Association reckons total instrument sales this year at \$120 million. Instrument industry sources call this figure extremely conservative. Outlook for '56: a minimum gain of 5 pct.

COKE: Will Pinch Hurt Steel Output?

Expensive beehive ovens re-activated to feed blast furnace demand . . . By-product coke expansion lags . . . Most of new orders are scheduled for replacement . . . Merchant producers thrive—By W. G. Brookfield.

♦ A SHORTAGE OF by-product coke threatens to hamper blast furnace operations, already strained to supply iron to help maintain capacity steelmaking production.

Firing up old beehive ovens will supply enough coke to meet blast furnace operations. But this is a highly uneconomical method of obtaining coke. In addition, many ovens are in bad shape and reactivation is expensive.

Current by-product coke oven expansion plans are inadequate compared with blast furnace projects under way or planned for completion in the next few years.

Orders Triple

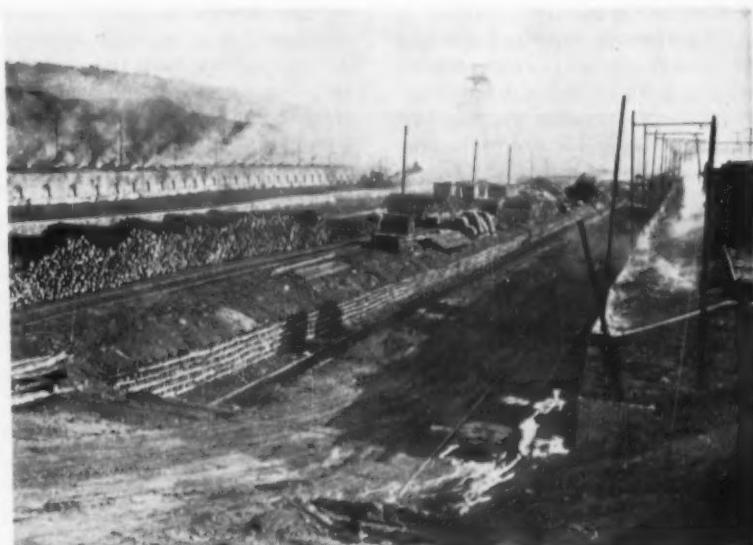
Orders for new by-product coke ovens tripled this year over 1954, but the bulk of these new facilities is going into replacement rather than new capacity. It is doubtful if they will result in any significant gain in capacity this year and, at the moment, the picture for 1956 isn't much better.

New coke ovens are larger and the ratio of coke to pig iron production is being reduced. But weighed against the percentage of existing ovens that have already outlived their life span by industry standards, new capacity will continue to lag.

By-product coke oven capacity at the end of 1954 was 78,596,600 tons, including merchant ovens. A full 31 pct of this total is over 25 years old, considered by industry as the normal life span.

Since 1949, blast furnace capacity in the U. S. has increased by approximately 19 pct. In the same period, coke capacity gained about 7 pct. By 1960, it is expected that blast furnace capacity will be up an additional 10 pct.

Beehive coke ovens, practically



BEEHIVE COKE OVENS are helping to alleviate present coke shortage, but won't solve the long-range problem. Bulk of new by-product coke ovens is going into replacement, rather than new capacity.

idle during 1954, produced 1,103,897 tons of coke through the first three quarters of 1955. Monthly production figures have increased 2½ times since the beginning of the year.

U. S. Steel Corp. fired up 500 beehive ovens several weeks ago at the Leisenring No. 2 mine near Uniontown, adding 25,000 tons per month to the total.

While there are thousands of beehive ovens still idle, this is an unsatisfactory answer at best. Many of the ovens are in bad shape from disuse and activation costs are prohibitive. Others are located in mined out areas, requiring additional expense of coal transportation. Independent operators are slow to light up new ovens without some assurance of a long range contract. Few of these, if any, are forthcoming.

More evidence of the coke pinch is the experience of the merchant coke oven plants. During 1954, business from steel mills was negligible and huge quantities of coke went into stockpiles. In the present market, stockpiles are dwindling and plants are busy.

Changes at Sharon

H. A. Roemer, chairman and executive officer of Sharon Steel Corp., Sharon, Pa., has taken over the presidency of Sharon Steel following the resignation of H. A. Roemer, Jr., as president and director.

The younger Mr. Roemer will devote his principal time to his other business interests, including direction of Forbes Steel Co., Canonsburg, Pa. Forbes makes reinforcing steel wire mesh.

TIN: Outlook Becomes Unpredictable

World supply exceeds consumption . . . Trend indicates good chance in near future for switch in positions . . . Would be 16th change since turn of century . . . Price fluctuating—By F. J. Starin.

♦ OUTLOOK for the future of tin in world markets is beginning to revert to form—considerable fluctuation and unpredictability.

Since the turn of the century, world production and consumption have been playing leap frog—taking turns exceeding one another, about 15 times thus far. While supply has exceeded demand since 1948, production is beginning to fall off while consumption is gaining. The differential in 1955 will be only about 20,000 tons. There is a good chance that in the near future demand will once again exceed supply.

Up until now this possibility has been remote since U. S. stockpile buying, which had been taking most of the surplus, has been tapering off. However, this country is now just about completely

off the world tin metal market and supplies of spot tin have decreased rather than the expected increase. New York price has risen from 97¢ a month ago to about \$1.08.

No Prospecting

One of the contributing factors in future outlook is communist terrorist activity in Malaya where better than one-third of the world's supply is mined and smelted. The current government, first to be popularly elected, is friendly to the U. S. Communists are a small minority, but they are active. There is a constant guerrilla-type war going on. So far the unrest has not hampered mining and smelting.

The future tin supply depends on discovery of new sources.

Geologists are sure that world ore reserves amount to better than 5 million long tons of which a major part is in Malaya. But extensive prospecting now is almost nil because of the hazard involved.

Indonesia, ranking among the top three tin producers, is constantly in the throes of political upheaval. There is a total of 190 political parties active in the island republic. No party ever gets a majority in an election. There are constant cross alliances and deals being consummated. Communists have taken advantage of the fact that the illiteracy rate is high. Many government officials can't read or write. The Communist party is one of four leading political factors. Thus far production here has held up fairly well, but anything can happen.

Rounding out the big three tin producers is Bolivia. Recently the country nationalized the large tin producing companies — Patino, Hochschild and Aramayo, and almost immediately production fell off. The move was a natural one since tin is Bolivia's major export. But the government is battling a crippling inflation and does not have the know-how to run the tin mining operations efficiently.

No tin is mined in the U. S. but one of the five major tin smelters in the world is situated at Texas City, Texas. It was built by the government as an emergency measure during World War II and is operated by Tin Processing Corp., Holland. It is of little world significance since its entire output is going into the stockpile. It is operating at a loss and at best only 50 pct of capacity. With elections in 1956 it looms as a political football.

Texas pressure groups interested in continued employment for



COMMUNIST TERRORIST activity has forced Malayan tin mines to employ native constables trained and skilled in the use of the modern sidearms they carry to guard work crews to, from and at the mining sites.

smelter workers and continued business for local suppliers are agitating to keep the smelter in operation. Nothing will be definitely solved until after the elections. Many sources believe it will be scrapped.

The U. S. is by far the world's largest customer, using 40 to 50 pct of world production exclusive of government stockpiling. Tin-plate, the biggest tin market in this country, is having a boom year. The outlook is for no letup into 1956.

Tin Agreement

In stockpile report to congress, ODM director Arthur S. Flemming said concerning tin: "Recently the minimum objective has been achieved and by the end of the fiscal year 1956 the stockpile will contain or have available sufficient tin metal to meet the long term objective."

Outlook for future stability and balance is not good but would be considerably worse except for the International Tin Agreement.

The agreement among major producers and consumers will go into effect upon ratification by Indonesia, the only producing country which has not yet done so. It will call for the establishment of a buffer stock of tin to be held off the market by a council of members. It will be sold when stocks drop and the price rises. Tin will be bought by the council for the buffer stock when world supply rises and the price falls.

Reliable Dept. of the Interior sources indicate that the State Dept. was ready to go along with the agreement in the hope of stabilizing price and supply-demand, but major American customers oppose the plan. All feel they can do better without being bound by foreign agreements.

The American companies are not worried about the communist threat in Southeast Asia, Malaya and Indonesia. The entire value of this area lies in its supplies of tin and rubber. There is more tin here than can be used by Iron Curtain countries so that even if the communists managed to seize the area they would be forced to put the tin on the open market or cut their own financial throats.

RESEARCH

WASTE: Steel's New Approach

Seven steel firms team up to prove out waste pickle liquor recovery plant . . . Pilot plant to be built near Niles, O. . . . Blaw-Knox agent for Ruthner process.

♦ SEVEN major steel producers and Blaw-Knox Co. of Pittsburgh have announced a joint project for erection of a pilot plant at Republic Steel's Niles, O., cold rolled mill based on the Blaw-Knox Ruthner pickle liquor recovery process.

Charles Hauck, Blaw-Knox vice president, told a meeting of stream pollution authorities the new plant, first of its kind in the U. S., is expected to prove a successful system for recovery of steel industry waste acid. And with favorable conditions it should show a profit.

The new plant is still in the design stage but is expected to be in operation by mid-1956. Participating companies are Republic, U. S. Steel, Jones & Laughlin, Youngstown Sheet & Tube, National, Wheeling and Pittsburgh, plus Blaw-Knox.

Cost Studies Cited

The semi-commercial unit at Niles will be rated 650 tons per year of sulfuric acid. Mr. Hauck estimates that a recovery plant for treating waste pickle liquor from a steel plant normally using 10,000 tons annually of 60° Be sulfuric acid would cost \$600,000 and recover the acid at a cost of \$35.40 per ton of 100 pct acid including all charges. On a plant twice as big costing \$1.05 million, costs would be reduced to \$31.80 per ton. A third type of plant would cost \$630,000 and recover sulfuric acid at a cost of \$14.05 per ton based on high acid pickling, and pickling the same amount as the first type. A fourth high volume, high acid pickling plant would cost \$1.1 million and recover acid at \$12.50 per ton.

Principal advantages claimed for the new process are:

- 1) The entire sulfate equivalent of the waste pickle liquor is recovered as reusable sulfuric acid without the use of a contact or chamber sulfuric acid plant.

- 2) The only by-product obtained is iron oxide, which is practically pure and, when sintered, can be recharged to the blast furnace. It may possibly find use as paint pigment or as a base material for making powdered iron.

- 3) Since substantially all acid in the waste pickle liquor is recovered, the inherent advantages of high acid pickling can be economically realized for the first time.

- 4) Use of inhibitors in pickle liquor is common and in many instances is a substantial operating expense. A portion of these inhibitors is returned with the recovered acid, thus reducing the consumption of inhibitors.

European Plants

Blaw-Knox has signed an agreement Othmar Ruthner of Vienna, developer of the system, by which it becomes exclusive U. S. agent for the process in North and South America. Several plants have been designed by Mr. Ruthner and built in Europe.

Sign Tank Contract

Cadillac Div. of General Motors Corp. signs a new Army contract for continued production of the M-42 gun vehicle at the Cleveland tank plant.

Value of the award, placed for an unnamed number of vehicles, is \$23.5 million. Under a current contract, Cadillac already has enough M-42 production scheduled to last until about next May. Anticipated employment after that time is to be approximately the present level.

AUTOMATION: Survives First Probe

No need for controls now, says congressional group . . . Boom takes the sting out of job shift . . . But problems need continued study . . . Slump could bring on legislative action—By N. R. Regeimbal.

• CONGRESSIONAL study of the impact—and possible need for regulation—of automation is over for the time being.

But industry is going to have to continue trying in the future to head off unwarranted governmental controls as the technology of production expands.

In its first brush with the lawmakers over automation, business and industry fared pretty well. A joint Senate-House subcommittee on economic stabilization, headed by Sen. Paul H. Douglas, D., Ill., after several weeks of hearings on automation, concludes that while no new legislation is needed now, the matter bears watching.

Warn About Slump

The subcommittee in its report points out that the shift to automation is coming in a period of high employment and prosperous economic conditions. In such a period, the report says, dislocations and adjustments are less painful.

But a significant increase in unemployment, or a slip in economic activity, might provide the basis for controlling legislation, it hints.

Progress Pleases All

From the plus side of the automation ledger, the subcommittee notes that:

All elements of the American economy (labor, management and government) seem to accept and welcome progress and increasing productivity.

Whole new industries have risen and may be expected to continue to grow as a result of automation and new techniques.

Goods and services not previously available or possible are made possible by the introduction of automatic processes creating new job opportunities.

On the minus side, the lawmakers complain that many individuals—both business and labor—will suffer personal, mental and physical hardships as the adjustments to automation are made.

And the nation, partly because of increasing demands brought by automation, is faced with a threatened shortage of scientists, technicians, and skilled labor.

There is little doubt, the report says, that large business may find some advantage in automation, because it is often dependent on large initial investments and results in mass selling of standardized units.

But smaller, less expensive models of automated machinery will probably become available, the subcommittee says. And relatively small business may be able to turn the disadvantages into advantages by capturing the business left behind by the larger firms fighting for mass markets.

Wages:

Court upholds uniform rates for U. S. contracts.

Government is within its legal rights in setting nationwide minimum wages in industries holding federal contracts.

U. S. Court of Appeals in a 2-1 decision throws out an earlier decision by a federal judge which would have restricted the U. S. Labor Dept. to setting minimum wages on a local basis.

Fixing minimum wages on the basis of the wage prevailing in each local area "would freeze the competitive advantage of concerns that operate in low-wage communities and would in effect offer a reward for moving into such communities," the appeals court rules.

In addition, the court points out there is frequently only one plant of an industry in an area, and it necessarily pays the wages that prevail in its area.

What's in Store Against Automation

A Joint Senate-House subcommittee recommends:

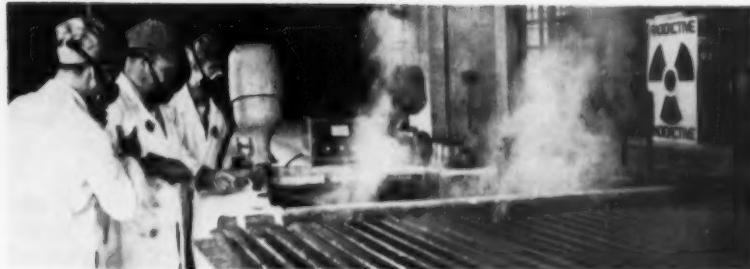
GOVERNMENT expand job placement service; unemployment assistance; productivity and job shift studies.

INDUSTRY recognize the problems of worker displacement.

UNIONS continue to welcome, not fight, technological improvements.

ISOTOPES: May Mean Better Wire

Radioactive lime in lubricant tells Geiger counter degree of residue left after cleaning . . . Experiments to perfect the technique continue . . . Expect better cleaning methods to result.



PROTECTIVE EQUIPMENT guards workers from radioactivity.

♦ **RADIOACTIVE TRACERS** may take an active hand in improving steel wire products.

In research conducted by American Steel & Wire Div. of U. S. Steel and Battelle Memorial Institute, radioactive tracers are used to detect the presence of lime residue on drawn steel wire.

If carried to a successful conclusion, the effectiveness of cleaning methods used on drawn wire before coating can be precisely measured. This would lead to a more effective removal of the wire drawing coating with the result of better bonding.

Radioactive isotopes can detect the presence of lime residue as fine as .0000025 in. The lime is used as part of the lubricant during the drawing of the wire and must be completely removed. Otherwise, it inhibits bonding of the wire to any of the coatings commercially used.

Thus far research on wire cleaning methods has been severely restricted because of the lack of such controls.

In the experiments, researchers added a small, carefully measured amount of radioactive lime to the conventional liming tank. The radioactive material was Ca 45, an isotope made by subjecting normal calcium to radiation from an atomic pile. The wire to be drawn passes

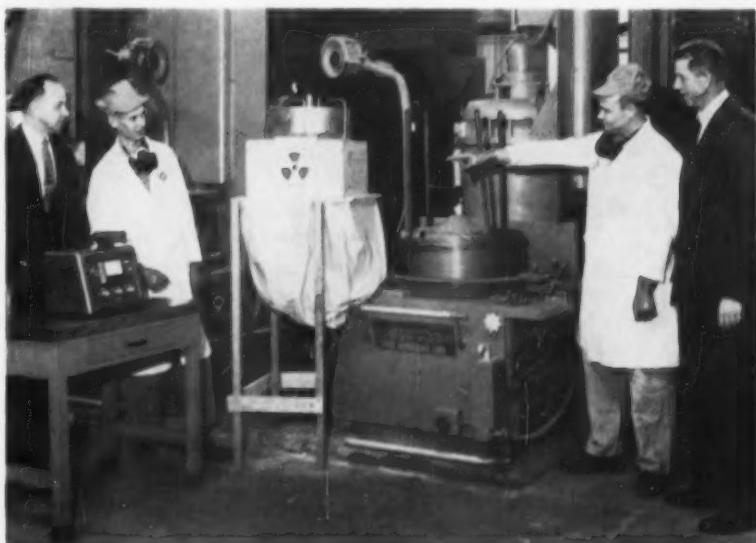
through the liming tanks and then two successive dies for reduction to desired size.

Cleaning methods now used consist of charring the lubricant for easy removal in an acid bath. Before and after the process, samples of the wire are tested with a Geiger counter which detects the extent to which the radioactive lubricant is present.

Thus far work has been done

with only slight radiation intensity to eliminate the necessity of costly safety devices and precautions. This tends to make the detection of the exact amount of the lime residue more difficult. At present large samples of wire must be tested in order to get a true reading. Work on the process is continuing with a view to solving this and other problems that may be resolved through use of tracers.

The American Steel & Wire experiment is another of the growing number of uses in industry of radioactive tracers to improve quality of manufactured products. This application may be the first experiment directly involving a finished steel product, although tracers have been used in blast furnace and steel-making operations. Radioactivity is so slight in this test that only minor precautions are necessary to assure complete safety of workers.



GEIGER COUNTER records traces of radioactive material left after cleaning process. Method provides a control to assure adequate cleaning.

AID: World Leans on U. S. Know-How

American experience in mass production is helping foreign countries boost output . . . Republic Steel sets up new division to meet world demand for technical engineering skills . . . Machine tool angle—By T. M. Rohan.

• AMERICAN know-how in the intricacies of mass-production is playing a leading role in meeting production goals in booming Germany, South America, and other countries.

As a case in point, Republic Steel Corp. has set up an International Products Div. to handle increasing demands from foreign countries for technical, engineering and manufacturing know-how. Heading it will be David H. Bellamore, Republic's general export manager since 1934.

"These requests for aid and advice from foreign countries have grown so large this year that we have decided to set up this special department so we can give them better service," says Republic. "We're not in this to sell more steel or increase our export market. But by giving these people

a helping hand in setting up their new plants economically and efficiently, we feel we can make a major contribution to those parts of the world.

"We are not spending any of the stockholders' money since there's no capital investment involved. We will, of course, get paid for our services but it isn't the primary consideration and we're not going to sell any more steel over there because of it. We'll help them turn out the products they want and help raise the standard of living, with all its political implications."

Machine Tool Setup

Armco Steel also has heavy operations from Mexico to the Belgian Congo and engineers government projects in connection with sale of locally-fabricated corrugated drainage pipe products.

Machine tool builders, who have enjoyed a major market in Europe, have long been on the bandwagon. Amertool Engineering Services, made up of 16 major non-competitive American machine tool manufacturers, is preparing to add another engineer-serviceman to its European staff, in addition to the 5 already there. The group is administered by a Cincinnati Milling Machine Co. official. Major new demand is coming from the overseas automotive industry, anxious to get the automation show on the road.

The group is operating in Germany, Austria, and England and under a separate group in Latin America, Japan and Korea. In the latter countries, credit assistance is also available through the World Bank.

A similar group, the American Machine Tool Export Assn., also functions in Europe as sales and engineering consultants working through existing European firms. Both make it possible for American firms to have direct representatives in Europe in close contact with latest developments in the U. S. Cincinnati Milling's new plant in Holland already has 4-6 mos. backlog of work and its older English plant is booked solid.

Heavy Equipment

Tata Iron and Steel Co. of India has contracted with Kaiser Engineers to design and construct a \$130 million expansion. Its Jamshedpur works output will be materially boosted through new integrated facilities and a good part of the equipment will come from U. S. manufacturers. A team of 6 Kaiser engineers recently spent 4 weeks in India gathering data.



TURBANED Arabs working on assembly of large culvert illustrate the need for technical know-how in world's far-flung steel markets. Steel industry is launching broad programs of technical education.

Heavy equipment manufacturers like Allis-Chalmers are finding rough going in Europe with heavy freight factors and currency problems. So they are manufacturing equipment there under their own supervision. Warren Holmes, assistant export manager, says his firm in the last 2 years has built over \$4 million worth of cement and coal processing machinery equipment in France for use there and enlarged its Paris office with U. S.-trained engineers.

Teach Engineers

Huge crushers are being built in Sweden for iron ore mines since transactions must be made in local currency, giving them a currency advantage over German makers. Allis-Chalmers engineers make complete layouts of mines and processing equipment. The Milwaukee firm for years has also had an extensive 2-year course for engineering graduates for its own sales and engineering offices. Many foreign engineers are included in the course and assigned to foreign offices or distributors. Some foreign customers' engineers are also trained in this way.

Most American engineers will concede that their European counterparts bring out proportionately a larger amount of basic research and discoveries. But they reason that Europe has traditionally been a minus raw materials area. So greater effort is concentrated on getting the most out of the available materials or making a substitute work. This trend probably hit its peak in the "ersatz" economy of pre-war and wartime Germany.

American engineering, on the other hand, has traditionally been directed toward mass production—development of machinery to turn out a given product faster, better and at lower cost than the competition. An indication of this is seen in rosters of metallurgical engineers in the U. S., for example, where those in the processing field far outweigh those in basic research.

So the marriage of European ingenuity with American mass production is raising the standards of both groups.



JOHN V. BURLEY, right, assistant general manager of sales, Republic Steel Corp., is sworn in as director of BDSA's Iron and Steel division. Charles F. Honeywell, BDSA administrator, gives oath of office.

Spies: Pentagon rejects demands for tighter security.

Government is generally standing pat in the face of strong opposing pressures to tighten, or loosen, its security system. Indications are that existing security systems for various types of workers will not be materially altered.

Defense Dept. is rejecting a Hoover commission suggestion that it check on its intelligence workers by conducting checks every five years. Such investigations of investigators, the government says, would serve only to alert suspects. However, the entire system of employee security checks is being carefully reviewed.

Fight Ouster Move

Pentagon is also defending its practice of citing the associations and activities of relatives of accused persons. But it maintains that a suspect individual is not automatically given an undesir-

able discharge or dismissed as a security risk because a sister, mother, or even wife is a Communist.

At the same time, the UAW and other CIO unions are lashing out at efforts of some congressmen, including Sen. John Marshall Butler, R., Md., to expand the present industrial security program to bar security risks not only from classified work, but from defense plants as a whole.

Order Carrier Jets

A \$100 million contract for production of Crusader jet fighters (F8U-1) has been awarded Chance-Vought Aircraft, Inc.

Chance-Vought will produce about 100 of the supersonic jets at its Dallas, Tex., plant. The Pentagon says the Crusader is the world's fastest Navy fighter.

The Crusader is designed primarily for carrier operations. Flight speed is disclosed to be 1000 mph—nearly 1½ times the speed of sound. Pratt & Whitney J-57 engines, producing 10,000 lb of thrust, will power the planes.

EXPANSION IN INDUSTRY

Railroad:

Pennsylvania to spend \$12 million for new shop

Two of the three half-mile indoor assembly lines being built by the Pennsylvania Railroad for repairing and rebuilding freight cars, at a cost of over \$12 million, are set to begin operations.

The shop, named after Samuel Rea, president of the railroad from 1913 to 1925, is located at Hollidaysburg, Pa. The operation will be geared to handle 50 cars per day. Initial work will be done on only gondolas and hoppers. But when the third line is finished and the shop starts operating at full scale in June 1956 all types of freight cars will be repaired.

Pennsylvania officials claim that the building itself, as well as the operation, is one of the biggest of its kind in the world. The length of 2760 ft is greater than would be the sum of the Empire State Build-

ing and the Eiffel Tower laid on their sides. Twenty-five miles of fluorescent lights are needed.

Eventually it will completely replace the nearby Altoona, Pa., operation.

Manufacturing:

Shipments, backlog and book values show slight rise

Shipments by manufacturers in October increased over September but by less than the usual seasonal amount.

New orders received in October totaled \$28.1 billion; up \$5 billion over a year ago but three pct under September after adjustment.

However, new orders received were more than October shipments so that backlogs of unfilled orders continued to rise. Total was boosted about \$300 million with most of the rise accounted for by machinery and transportation equipment.



REMINISCENT of the medieval iron maiden torture chamber is this device at U.S. Steel Johnstown Works for removing fins or "whiskers" from nails.

New Plant:

Armco to build prefab to make prefabs

Armco Drainage & Metal Products, Inc., subsidiary of Armco Steel Corp., plans to spend \$1.5 million to construct a new plant in Middletown, Ohio, to house a prefabricated steel building manufacturing operation.

Work will begin immediately with the start of production set for summer 1956.

New plant itself will encompass many of the prefabricated features which will be covered in the new product line.

Expansion Briefs

Rockwell Manufacturing Co., Barberton, Ohio, Div.; modernization program aimed at increasing valve production 50 pct, cutting costs.

Aluminum Company of America; Alcoa, Tenn., works; plant extension to house new 44 inch rolling mill; cost \$4 million.

Alexson Manufacturing Co., Div. of U. S. Industries, Inc.; new facilities for making landing gear and components; Montebello, Calif., plant; cost \$1 million.

Joseph T. Ryerson & Son, Inc.; purchased warehouse and contents of Wallingford, Conn., plant, Follansbee Metals Corp.

Geo. B. Smith Chemicals Works Inc.; Maple Park, Ill.; completed new facilities aimed at doubling chromium oxide production.

Black and Decker Manufacturing Co.; \$8.5 million addition to electric tool plant; Hampstead, Md.; increase plant area 50 pct.



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Now, Denison hydraulic Multipress makes set-ups faster than possible with fixed-stroke presses. With Multipress inching control, the ram can be inched to the convenient point for attaching dies. And the smooth, variable hydraulic stroke gives set-up men perfect control of the ram.

Amperex uses three Multipresses for blanking, piercing, forming, drawing and broaching steel and non-ferrous metals . . . to produce a wide variety of shapes and sizes.

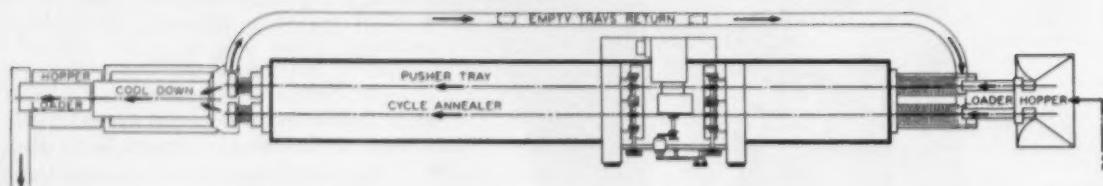
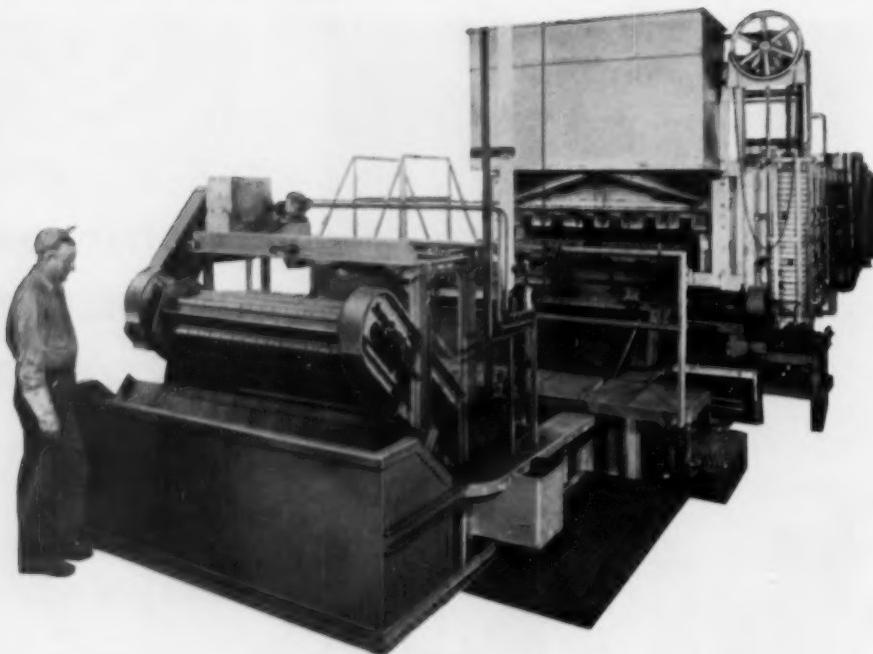
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This 'Surface' automatic cycle annealer operates at the rate of 2,000 lbs/hr, isothermally annealing forgings of SAE 8717H, 1117, and 1137 steels.

Automatic cycle annealing repays Marion Division 4 ways

(1) Faster production, (2) product uniformity, (3) reduced machining time, and (4) reduced handling have more than repaid the Dana Corporation, Marion Division, since they installed 'Surface' automatic cycle annealing equipment.

Their cycle of heating-soaking-fast-cool-holding-fast-cool is about twice as fast as conventional annealing. At the same time, it provides exceptional control of metal structure, and results in better machinability. Furnace mechanization precisely regulates work time in each zone of the cycle, and can be varied to suit the steel.

Automatic loading and unloading provide smooth, straight-through operation and cut handling costs. Why not ask 'Surface' to help you apply these advantages to your own annealing operations?

Write for Bulletin H55-B

SURFACE COMBUSTION CORPORATION, TOLEDO 1, OHIO
Also makers of Janitrol automatic space heating and Kathabar humidity conditioning units



Report to Management

Big Plans Ahead

For all practical purposes, you can write off 1955 as just about the biggest and best and start looking ahead to next year. If you aren't already making plans, you may be too late. Most business is already knee deep in next year's business decisions.

You can count on a continued swing to capital improvements. Dept. of Commerce reports indicate plant and equipment expenditures for the first quarter of 1956 will be at a rate of 12 pct above the average for this year. Most of the increased outlay will come from railroads and manufacturing companies.

If you are statistically minded, capital outlays for 1955 will reach \$28.3 billion, \$1.5 billion more than business spent last year and about what was spent in the record year 1953. First quarter spending next year will be a full 25 pct higher than the same period this year.

Wrapping It Up

The year is drawing to a close with all the bulls in ascendancy. November employment was at the highest level for that month in history—64,800,000 persons at work.

Personal income in October, last month recorded, was running at an annual rate of \$309.5 billion, up a full \$1.5 billion over September. Most of the rise was in wage and salary payments. This means that there will be plenty of extra money for Christmas, and retailers are already pocketing proceeds from the biggest holiday spending spree.

No Bad News Anywhere

You can consider the balanced budget in the bag too. Sec. Humphrey isn't kidding or making loose statements when he says flatly that the budget will be balanced regardless what alarmists say.

Defense spending is the question mark on budget considerations. But you can be sure that this has received full attention by the administration. The \$34.5 billion defense budget covers cold war possibilities, means a strong and adequate defense.

That doesn't imply that defense budget requests weren't pared to the bone of extras. The \$34.5 billion is about as close as you will ever come to a defense budget meaning just that—defense.

It may mean tears at the officer's clubs, but swimming pools and other frills will have to wait. Probably no one will ever get all the excess out of a military budget, but this one is about as close to it as possible.

Why All the Fuss?

After all these years, you may wonder why there's so much emphasis placed on balancing the budget. For one thing, it was a big campaign promise and there's a big election coming up.

But that's not the main reason, although you'll have to concede that's important if you are at all realistic. The big reason is to curb inflation, the factor behind almost all the Administration's fiscal policies.

There is considerable concern over preserving the nation's fiscal integrity. Nothing encourages inflation more than a government spending more than it takes in. Keeping spending within income is the key to keeping inflation under control.

Even with the cold war's expense, feeling is that if the budget can't be balanced in a year of peak prosperity, when can it? These are the main reasons for the determination to get back into the black.

INDUSTRIAL BRIEFS

Incandescent Bulbs . . . General Electric Co. announces improvements in the incandescent light bulb. Developments now being placed in effect will increase lighting output from 6 pct for household bulbs to 15 pct for higher wattage bulbs used in industrial and commercial lighting. No more electricity is required.

Acquisition . . . Walworth Co., manufacturers of valves and pipe fittings, has contracted to acquire all common stock of the Conoflow Corp., Philadelphia, producer of pneumatic automatic valve control equipment.

Expansion . . . Vento Steel Products Co., Inc., Buffalo, announces plans for a \$100,000 expansion that will add about 15,000 square feet to its plant. The company makes steel and aluminum windows, lintels and wall frames. Employment at the plant, which has a payroll of 120 at peak production, is expected to be increased when the addition is completed next spring.

Styron Plant . . . Dow Chemical Co. and Kilachand, Devchand and Co., Ltd. of India have formed a company to manufacture polystyrene plastic for Indian molders. The new company will erect a plant near Bombay, the first polystyrene unit in South and Southwest Asia.

Reallocation Problems . . . Job reallocation problems which arise from automation are being handled without serious hardship, because of the high flexibility of the labor force. The National Association of Manufacturers declares that the number of persons who voluntarily shift their jobs each month is more than two per cent of the total labor force.

Freight Cars . . . The Bessemer, Ala., plant of Pullman-Standard Car Mfg. Co., has received two additional orders for 500 freight cars costing a total of around \$7.5 million. Central of Georgia Railway Co. ordered 500 40-foot, 6-inch box cars costing about \$3.5 million. Seaboard Air Line Railroad Co. ordered 500 70-ton hopper cars to cost approximately \$4 million.

Construction Contract . . . Granite City Steel Co. has awarded Koppers Co., Inc., a contract for construction of a new blast furnace in Granite City, Ill., to produce 1200 tons of pig iron per day. This almost doubles the capacity of the present furnace and will increase the entire plant pig iron capacity almost 45 per cent.

Progressive Step . . . U. S. Steel Homes, Inc., has retained Housing Securities, Inc., New York, as a consultant on market analysis, merchandising, and other related endeavors in the housing field.

Agents Appointed . . . Alco Products, Inc., announces appointment of Power Machinery Co. as agents for its new Alcotwin line of finned tube heat exchangers. Power Machinery Co. will offer a complete line of heat transfer products for every process requirement in the Southwest.

Firehouse . . . Firehouse in Birmingham, Mich., is equipped with a new stainless steel firemen's slide, replacing the traditional brass pole.

Young Inventor . . . The K-Square, a drafting tool including a T-Square, triangle and ruler has been invented by 16 year old Lawrence Kalmis, New York. The instrument has a patent pending.

Wheel Braking System . . . A British organization has developed a new wheel braking system which, it claims, will reduce tire wear, results in a weight saving of one per cent. It is expected to increase breaking efficiency and operate effectively on wet and icy runways.

New Program . . . An engineering and management course with no formal educational prerequisites will be held next January 23 to February 2 on the Los Angeles campus of the University of California. The program is designed for presidents, vice-presidents, executives, supervisors and individuals training for these positions.

Computer . . . An "electric brain" which simplifies reports now requiring a billion pieces of paper annually will be installed in Cleveland's Terminal Tower for use by the Chesapeake and Ohio Railway. The computer is capable of adding numbers a thousand times as fast as punch card equipment.

Crucibles . . . Electro Refractories & Abrasives Corp. has increased the capacity of its crucible mix department by 25 pct. The company will now be able to make crucibles of 1,000 pounds or more in one batch.

Nuclear Center . . . Combustion Engineering, Inc., has contracted to purchase a 530-acre site in Windsor, Conn., for construction of a nuclear engineering and development center. It will comprise facilities for design and development of nuclear reactors and reactor cores for related atomic fuel elements. Costing about \$5 million, the center will begin operations late next year.



SHELL RESINS... used extensively at FORD



Parts by the million for
'56 Fords are

PRECISION-MOLDED with G-E SHELL RESINS

Ford Motor Company, one of the country's biggest precision molders, uses shell resins for precision-molded crankshafts, camshafts, exhaust valves.

Why did Ford turn to precision molding? Because of the advantages this method offers over conventional sand-casting: greater dimensional accuracy, smoother surface finish, drastic reductions in machining! And the Ford foundry uses G-E shell resins for fast-curing, dimensionally stable shells necessary for high-volume production.

How can shell molding help YOU?

General Electric offers a number of foundry products to help you get maximum benefits from the new process: *G-E phenolic shell-molding resins* to form light, dimensionally accurate molds . . . *G-E silicone parting agents* to secure quick, easy release of molds from patterns . . . *G-E phenolic bonding resin* to cement shell halves together.

Progress Is Our Most Important Product

GENERAL **ELECTRIC**



Ask G. E. about shell molding!

General Electric maintains a shell-molding laboratory in Pittsfield, Mass., to help users and prospective users of shell molding solve problems and evaluate the process for their own needs. G.E. also offers an informative 28-page manual describing the techniques and benefits of this new foundry method. Just mail the coupon for a free copy!

FREE SHELL MOLDING MANUAL!



General Electric Company
Section #1522-6C
Chemical and Metallurgical Division
Pittsfield, Massachusetts

Please send me a free copy of *G-E Shell Molding Manual*.
 We are presently using the shell-molding process.
 We are interested in the shell-molding process.

Name _____

Firm _____

Street _____

City _____ Zone _____ State _____



Where Will Horse Power Race End?

Industry is committed to more power . . . Public takes to hp ratings in sales battle . . . Gas turbine still not ready for mass production . . . Gray market nickel adds about \$8 to car's cost—By T. L. Carry.

♦ SOME auto engineers in Detroit are not particularly happy that the emphasis on hp has reached such tremendous commercial proportions. But whether they like it or not, engine designers are in the hp race to stay.

Sales departments have been using power as a selling point for so long now that the public naturally expects bigger and more powerful engines everytime a producer introduces a new model.

As a result, designers feel they have a bear by the tail and don't dare let go.

In some cases, the race for more power has been extremely costly for companies that did not plan ahead for it. It has involved extensive retooling in a much shorter time than was originally

scheduled. Most of the automakers now design engine blocks big enough so that it is not necessary to change the entire engine in order to squeeze a little more power from it.

Hp Helps . . . Engineers are quick to emphasize that a more powerful engine does give a driver certain advantages such as more ease in passing and merging with traffic. However, they also add that an engine's maximum hp is only obtained at very high driving speeds and so it is not necessary in normal driving ranges.

Nobody will say where the race will stop because nobody knows. But one thing is certain and that is that the race is still on.

So it is safe to assume that en-

gines are going to get bigger and more powerful until styling trends make a smaller plant necessary or the public becomes less power conscious.

Turbine Not Ready . . . This does not mean that the industry is considering throwing out the piston engine and substituting a gas turbine overnight. Far from it.

In the first place, the gas turbine for use in passenger cars on a mass production basis is still a long way from reality. Secondly, there is still room for improvement in the present engine.

If styling trends make it necessary to lower the hood of the car in the future, the carburetor and air cleaner can be knocked off the top of the engine and a fuel injection system can be substituted to fit under the hood.

But this presents problems. The first one is the present high cost of a fuel injection system. It is possible to get the costs down through mass production methods, but then it becomes a question of whether fuel injection has much advantage over the present carburetors.

The purpose of fuel injection is to distribute fuel and air to each cylinder in an engine in precisely the right amounts at precisely the right time. Under certain conditions, the system works better than a carburetor. But in lower speed ranges, where most of today's driving is done, a carburetor works just as well.

However that may be, you can look for fuel injection to become almost universal in the industry

Is \$81,000 Brainwashing?

A Pontiac dealer defying mighty General Motors before a Senate investigating committee became a national figure last week.

M. H. Yager, of Albany, New York, accused GM of "brainwashing" the dealer body to a dogma of more and more production and wilder and wilder methods of distribution.

He also complained that the doctrine of gyrating production results in forced distribution, rampant bootlegging and unreasonable credit practices.

In addition, he claims, all the fun, ethics and dignity have gone out of the automobile business.

In Mr. Yager's case, it appears that everything has gone out of the

business except profits. That is, according to a GM statement released after the dealer's testimony.

Since 1941, when he originally became a Pontiac dealer, Mr. Yager has made a total gain of \$1 million on an original \$5,000 investment. To help finance the dealership, GM's Motors Holding Div., advanced him \$30,000 at the time.

His sales fell off for the last three years, but in 1954 and again this year he asked for additional Pontiac dealerships in New York State.

Through October this year, Mr. Yager has made a gain of \$81,898, including net profit after taxes, salary and dealer's bonus, now accuses GM of hitting below the belt.

New process gives more corrosion-proof chromium finish

♦ Hard, wear-resistant Unichrome Crack-Free Chromium plated directly on steel stops rust . . . proves superior to ordinary chromium

♦ Improved non-galling, non-seizing finish achieved also with United Chromium's process

Chromium can now be plated without the network of fine cracks which occur in ordinary chromium more than a few ten thousandths of an inch thick. United Chromium has developed a solution for Crack-Free Chromium Deposits.

SALT SPRAYED 100 HOURS — NO CORROSION

Splined steel shafts used in washing machines were plated directly with chromium and then salt-spray tested by the manufacturer. With .0005" of ordinary chromium, the corrosive penetrated the cracks and shaft surfaces were completely covered with rust in less than 100 hours. With .0005" of Unichrome Crack-Free Chromium, surfaces were unblemished after 100 hours.

LONGER LIFE FINISHING

Unichrome Crack-Free Chromium is a gray matte plate, but buffs readily for high luster. It does not depend on scarce nickel for long life.

In other ways, too, the new finish proves superior to ordinary chromium. One user increased life of chromium plated dies 20% by switching to the new process. Another was able to take faster and deeper grinding cuts in plated cams and end the service failures encountered with ordinary chromium.

This is just one of many United Chromium developments in processes, equipment and materials which provide opportunities to cut your finishing costs . . . opportunities to turn out a better product through a better finish. We'd welcome the chance to work with you.



METALLIC and ORGANIC FINISHES... EQUIPMENT

UNITED CHROMIUM DIVISION
METAL & THERMIT CORPORATION

100 East 42nd Street, New York 17, N. Y.
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In Canada: United Chromium Limited, Toronto 1, Ont.

ABRASIVES WERE AN AID TO ROMAN construction and conquest.

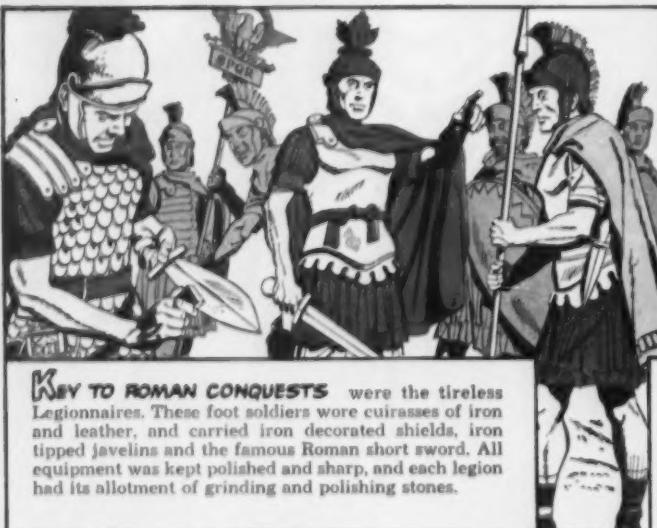
NO. 5 OF A SERIES
ON THE HISTORY OF ABRASIVES
BY CHICAGO WHEEL & MFG. CO.



'The glory that was Rome' is debatable among historians. Surprisingly, Rome is more often remembered for its decline and fall than for its accomplishments. However, all agree the Romans were great builders. Their temples, villas, arenas, and triumphal arches testify to this. In building construction as well as in the weapons of war, abrasives and grinding played a part.



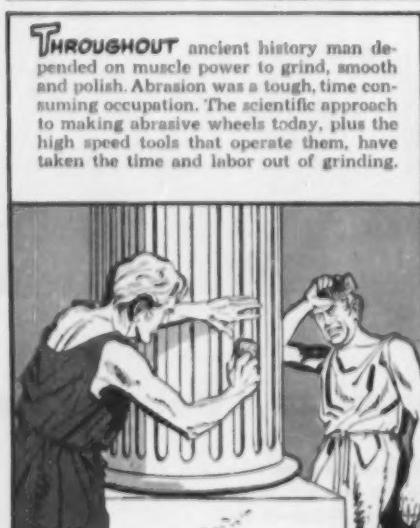
IN THE DAYS of the Empire, the principal building materials were stone, brick and cement. For the more important buildings slabs of marble were laid over the rough structure. The removing of burrs on stone, the smoothing of mortar and the grinding and polishing of marble was done with abrasive rock, sandstone and pumice.



KEY TO ROMAN CONQUESTS were the tireless Legionnaires. These foot soldiers wore cuirasses of iron and leather, and carried iron decorated shields, iron tipped javelins and the famous Roman short sword. All equipment was kept polished and sharp, and each legion had its allotment of grinding and polishing stones.



ABRASIVES were common to the Roman home. Pliny and Lucian wrote of metal mirrors, made of a mixture of copper and tin, which required frequent grinding to enhance their reflective quality. For this purpose a sponge full of powdered pumice-stone was often kept hanging near the mirror.



THROUGHOUT ancient history man depended on muscle power to grind, smooth and polish. Abrasion was a tough, time consuming occupation. The scientific approach to making abrasive wheels today, plus the high speed tools that operate them, have taken the time and labor out of grinding.



A new factor in the manufacturing of mounted wheels and points is Chicago Wheel's positive production control. This means mounted wheels and points can now be produced alike in every detail. There is no variance from one production run to another. In other words, if you used a particular wheel type for a job one month ago and now want another order, the new wheels will be exactly the same. You can imagine the advantage here in production grinding.

CHICAGO WHEEL & MFG. CO.

1181 W. Monroe Street, Chicago 7, Illinois, Dept. IA



PROVE TO YOURSELF...
Chicago Wheel's positive production control. Write for test wheels to use in actual production. No charge.

Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
Dec. 10, 1955	188,334	28,956
Dec. 3, 1955	184,336	29,170
Dec. 11, 1954	153,296	22,779
Dec. 4, 1954	148,790	22,387

*Estimated Source: Ward's Reports

in a relatively short time. The dictates of sales departments plus the trend toward lower cars will be the deciding factors.

Compression Climbs . . . In the meantime, engines will not only increase in hp but their compression ratios will also be hiked. Predictions are that the ratio will go to 11 to 1 and even up to 12.5 to 1. The increases are going to be gradual, though, because today's gasolines are going to have to have a much higher octane rating to insure proper operation of the motor.

Nickel: Tight market boosts costs \$8 per car

It's possible that today's new car costs \$8 more than it should because of the nickel shortage and a resulting gray market.

John Palik, Jr., president of the National Assn. of Metal Finishers, estimates that 4 lb of nickel is used to plate the average car. He also says that gray market nickel costs about \$2 per lb more than nickel available through legitimate channels. Assuming that 8 million cars will be made in 1955, the extra cost, if gray market nickel is used for plating, will be \$64 million to the consuming public.

Mr. Palik's concern in the matter is the small job shops that do plating for larger manufacturers. In many cases, small platers cannot afford to pay the premium price for nickel and have been forced out of business.

Takes Steps

The National Assn. of Metal Finishers has recently taken steps

to stamp out the gray market, but so far, according to Mr. Palik, it has not met with much success.

Nickel allotments are such that it is difficult, if not impossible, to trace any deals which are not legitimate. Receivers of gray market nickel are usually so glad to get the metal that they won't say where they got it and the man who sells it isn't going to tell.

The group has turned to Washington in an effort to make it illegal to sell nickel through illegitimate channels. Although the platers do not complain about treatment by the government, they do claim that they could get more action if the industry were better organized and had a more powerful voice.

Meanwhile, the gray market is flourishing. Nickel which would bring around 92¢ on the open market is going for as much as \$3.50 per lb. Mr. Palik says the public is paying more for cars and other plated products because of what he calls "economic pigs who are stuffing their pockets with dollars."

But unless defense requirements change, no relief for nickel is in the foreseeable future.

THE BULL OF THE WOODS

AUTOMOTIVE NEWS

Studebaker Gains

Studebaker's complete restyling of its 1956 models in an effort to capture a competitive position in the low-price field is beginning to pay off.

Harold E. Churchill, manager of the division of Studebaker-Packard, reports that since the introduction of the new American-looking car, along with a complete line of sports cars, dealer orders have created a 36,000-car backlog.

Nearly 20 pct of these orders are for the four models in the new Hawk sports car line. Most popular of the 1956 models is the 4-door President.

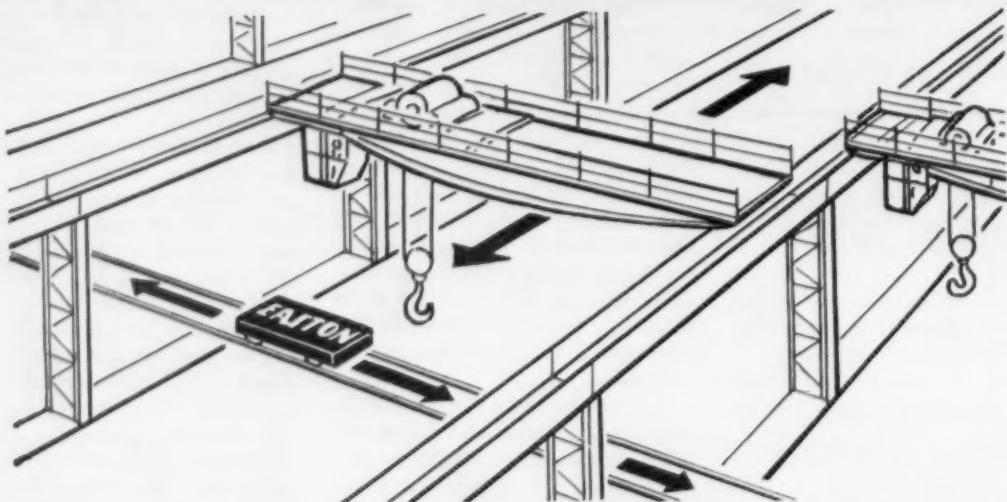
Studebaker's sales in the last 2 years were the largest in the industry for a car with a European design. But that volume was not big enough to maintain a healthy share of the market.

Orders for the new models are coming in so fast, production facilities at South Bend, Ind., have been accelerated to meet the demand for new cars.

By J. R. Williams



USE YOUR IMAGINATION WITH Cross-Bay® Transfer Cars



Infinitely variable application of EASTON motor-driven Cross-Bay Cars, together with the possibility of special super-structure design, provides full scope for imaginative planning in this growing era of automatic handling.

EASTON Cross-Bay Transfer Cars were originally introduced to supplement overhead crane service in modern parallel bay plants and for movement of materials between plant buildings, storage yards and shipping platforms. Operating men everywhere were quick to see the adaptability of the Cross-Bay idea to

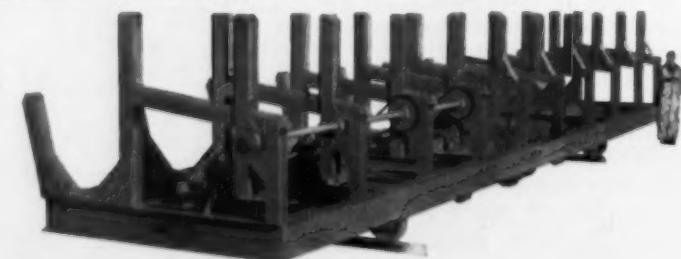
many other heavy handling and production problems.

EASTON Cross-Bay Cars, controls and special superstructures are custom-designed to meet individual requirements. Customers may specify electric motor, storage battery, gasoline-electric or gasoline-hydraulic power. Controls may be manual, electric (by push-button on the car or remote station) or electronic. EASTON Cross-Bay Cars can be built to capacities from 5 to 500 tons to fit any track gauge.

Investigate the EASTON Cross-Bay idea now for plant expansion and new plant programs.



IN A STEEL WAREHOUSE. Here a 12 horsepower gasoline-hydraulic EASTON Cross-Bay Car handles 25 ton loads of structural shapes in a steel warehouse. A comfortably seated driver operates the car at speeds up to 50 ft. per minute forward or reverse between plant buildings.



IN A STEEL MILL. Here a push-button control panel is attached by a 10 ft. cable to a 100-ton capacity 3 horsepower electro-fluid EASTON Cross-Bay Car. As the operator walks along the car follows carrying two 50 ton slabs of steel.



OTHER EASTON CUSTOM-BUILT CARS FOR INDUSTRY

Annealing Furnace Cars
Coal Charging Cars
Core Oven Cars
Gable Bottom Cars
Hopper Cars
Mine Cars

Motor Driven Cars
Newsprint Cars
Platform Cars
Quarry Cars
Rack Cars
Rocker Dump Cars

Scoop Cars
Skip Cars
Steel Mill Cars
Transfer Cars
Transformer Cars
Turntables

FORTY-ONE YEARS OF DEPENDABLE SERVICE IN THE DESIGN AND MANUFACTURE OF INDUSTRIAL TRANSPORTATION EQUIPMENT

EASTON
EASTON CAR & CONSTRUCTION COMPANY • EASTON, PA.
A-1047



Unions Drive to Widen SUB Wedge

New Campaign aims at more "guarantee" contracts . . . Labor will promote concept of full-year obligation for employers . . . Unions concede SUB will be problem for small companies—By G. H. Baker.

• UNIONS will drive hard for installation of more supplemental pay plans in 1956.

And union officials are warning their memberships that industry will "sharply attack" all attempts to put workers' income on an annual, or "guaranteed," basis.

AFL officials are on record as stating that many employers have an old-fashioned idea that they "owe no obligation to their workers except when they are employed."

(Evidently, employer thinking has got to be "educated" to the notion that putting wages on an annual basis through supplemental unemployment benefits is now an accepted principle of business.)

Admit Hardship . . . The AFL officials admit, however, that wage "guarantees" will be a heavy burden—in some cases, an impossible burden—on small business. Many smaller firms are just not in a position to guarantee anybody's wages, salaries, dividends, or even that next month's rent will be paid.

According to the AFL the solution to the problem of putting over supplemental pay plans on smaller firms is to get the government to write new unemployment laws and to force states to boost unemployment pay rates.

Buy More Missiles . . . Procurement of guided missiles, already humming along at the boom rate of about \$670 million a year, is to be sharply stepped up in the months ahead. Rate of buying may climb close to the \$1 billion

a year mark if the present trend holds up.

The Army has assigned top priority to procurement of guided missiles. For example, it is sending (as of Feb. 1) its ace trouble-shooter, Maj. Gen. John B. Medaris, to juice up the missiles program, and in particular to speed the development and production of a missile with a range of about 1500 miles, something now lacking in the defense pattern.

Long-range missiles—5000 miles—and short-range missiles—500 miles—are well along the road in development. Lag is in the so-called "mid-range"—1500 miles—missiles.

So-called "mid-range" missiles are to travel about 5000 mph and

will be able to hit targets 1500 miles from point of launching.

Push Big Wagons . . . The battleship is due for a comeback—in a new dress. If Congress says yes to an upcoming Navy request for funds, battleships will get a new lease on life as huge guided missile launching vessels.

Tip-off to the new program is in a new Navy list of ship classifications. In the list appears the brand-new category BBG—classification code for "guided missile capital ship."

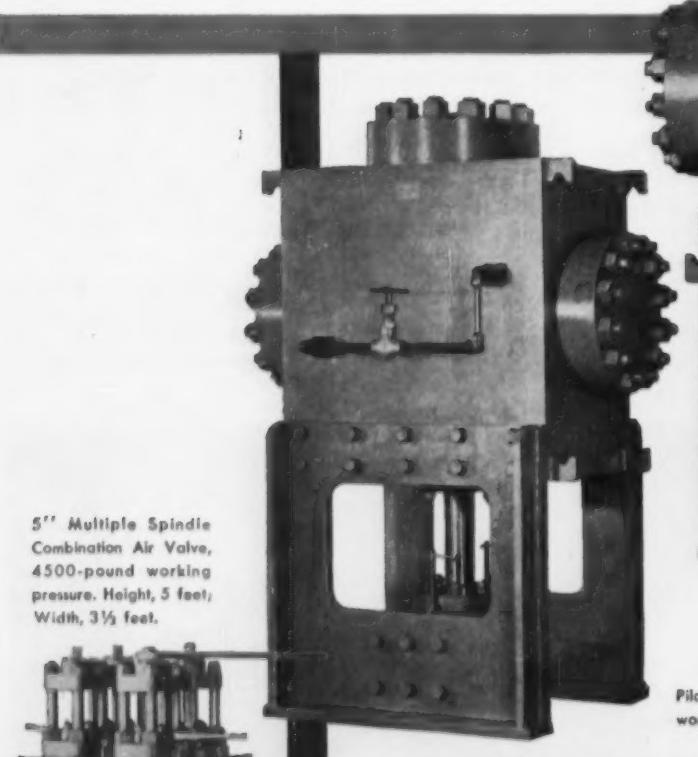
Plan Money Move . . . If it works to their satisfaction, they'll go to Congress again in 1957 to seek more money for at least several



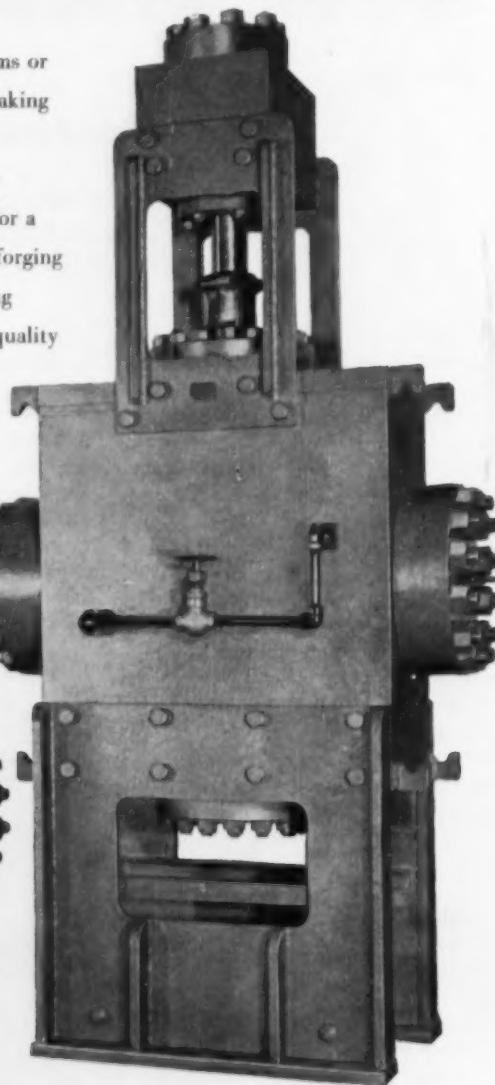
CORDIAL handshake marks start of Senate trust probe into General Motors operations. Committee Chairman O'Mahoney (left) and GM Board Chairman Sloan appear friendly enough prior to questions on coercion, monopoly.

SPECIALISTS IN HIGH-PRESSURE VALVES

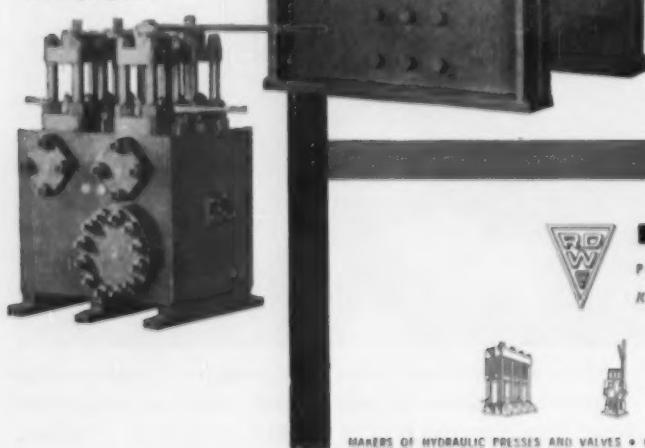
When you need a *special* valve—for hydraulic presses and systems or allied hydraulic equipment—call on R. D. Wood. Besides making a complete line of standard valves, we design, engineer and manufacture highly complex valves of many types for many purposes. The three shown here are representative valves used for a hydraulic system, 4500-pound working pressure, for a 35,000-ton forging and forming press. In these, as in all R. D. Wood products, long life and efficient operation are guaranteed by precise design, quality materials and craftsmanship of the highest order. Send for complete details on R. D. Wood high-pressure hydraulic valves.



5" Multiple Spindle Combination Air Valve, 4500-pound working pressure. Height, 5 feet; Width, 3½ feet.



Pilot operated 12" Balanced Stop Valve, 4500-pound working pressure. Height, 13 feet; Width, 6½ feet.



Pilot operated 12" Safety Shut-Off Valve, 4500-pound working pressure. Height, 9 feet; Width, 6½ feet.



R. D. WOOD COMPANY

PUBLIC LEDGER BUILDING • PHILADELPHIA 5, PENNSYLVANIA
Representatives in Principal Cities



MAKERS OF HYDRAULIC PRESSES AND VALVES • FIRE HYDRANTS • CAST-IRON PIPE • GATE VALVES • GAS PRODUCERS • ACCUMULATORS

more similar conversions. At least several hundred million dollars in procurement will be involved.

Contract-wise, the likely starting point in the new building program is the unfinished battleship Kentucky, at Newport News, Va. All work on the Kentucky stopped when World War II came to an end. She's an unfitted hull at this point, ready for fitting out with missile-firing machinery.

Hit Budget Balance . . . Days when business figured the national government ought to spend only what it took in—except in days of deepest trouble—are gone by the wayside.

A group of leading economists from universities, business, labor, and local governments, are telling Congress that a balanced budget is secondary to the general need of promoting economic growth and stability.

When the country's in boom times, they say, the government should spend less than it takes in, and in days of recession, it should spend more in order to bolster consumption.

The budget, under this theory, would be balanced only incidentally on the way up or way down, and if the system works, would actually tend to balance over the long economic cycle.

But the economists have a word of caution—it may work with the government, but businessmen and families shouldn't experiment with this kind of fancy bookkeeping.

Hit Advertising Curb

Federal control of insurance advertising is challenged by the ruling of an FTC examiner.

Examiner Frank Hier holds that the agency lacks jurisdiction over the advertising of accident and health insurance policies, except in those areas where adequate local laws do not exist. Laws are inadequate, he says, only in Montana, Missouri, Mississippi, Rhode Island, and the District of Columbia.

Hier's opinion is in connection with his decision that an FTC charge of false advertising against Federal Life and Casualty Co.,

Battle Creek, Mich., be limited to activity of the company in Mississippi, Rhode Island, and D. C. There is no evidence that Federal makes sales in Montana or Missouri.

The firm is one of 41 insurance companies against which the FTC has brought accusations of false and misleading advertising in slightly more than a year. Four cases have been settled by consent orders, leaving 37 to be handled.

Outcome of the remaining cases may be affected by Hier's ruling. The FTC, however, is not obligated to accept that decision and could reject it as a threat to agency authority.

Spending: **Manufacturers tell of big plans for 1956.**

High-gearred spending for new plant and equipment during the first quarter of 1956 is contemplated by businessmen.

They've provided estimates for the U. S. Commerce Dept. that indicate outlays at an adjusted annual rate of \$31.5 billion during the next three months. This rate would exceed the \$31 billion pace for the current quarter and be well in advance of the \$28.3 billion which expenditures for all of 1955 are expected to total.

Stress Rolling Stock

Manufacturers, especially in durable goods lines and railroads, are to make the largest percentage gains in plant and equipment investment early next year, compared with the 1955 average.

Durable goods producers look forward to a 25 per cent increase, and

WASHINGTON NEWS

nondurable goods manufacturers are raising their sights by 12 per cent.

Rail lines are increasing both their equipment and road programs, with emphasis on new rolling stock. The result is to be a 55 per cent spending climb from the 1955 level.

In dollar terms, the industry groups are to follow this investment pattern in the coming quarter: Durable goods, at a rate of \$6.8 billion; nondurable goods, \$6.64 billion; railroads, \$1.41 billion; nonrail transportation, \$1.64 billion; public utilities, \$4.52 billion; trade, service, finance, communication, and construction, \$9.64 billion; and mining, \$950 million.

Hold Discounts Legal

Dismissal of a suit charging Yale & Towne with threatening competition by giving quantity discounts on industrial trucks is recommended by a Federal Trade Commission hearing examiner.

FTC examiner Frank Hier rules—in a decision which is not final—that there is insufficient evidence to prove the charges that the firm endangered competition by granting discounts for both single orders and yearly cumulative totals.

He says price is not the prime factor in a great many sales in the industrial truck industry—engineering, design and performance are—and that competition in the industry is active and increasing.

No Controls for Beer Cans

■ The government says it is legal and proper for brewers to put beer in any size can they like. Number of sizes and types of beer cans has been on the rise in the past several years. As a result of the new container ruling, the range of sizes and types of cans is likely to increase, causing some effect on orders of tinplate.

Federal ruling was issued after some brewers asked the government to decree the 12-oz can as the "standard." Other brewers fought the application, pointing out that a man's got a right to quaff his brew from any size can he wants to. Internal Revenue Service agreed.

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Through Magnaflux Corporation, you have available the broadest range of nondestructive test equipment and materials. From dye penetrant inspection, through every type of magnetic particle and fluorescent penetrant inspection as well as ultrasonic and eddy current inspection methods, you can select the type to meet your needs, exactly.



Just Spray it On to Find Cracks

The improved dye penetrant inspection with all materials in pressurized cans . . . A COMPLETE PORTABLE KIT FOR ONLY \$36.00. (Includes \$1.00 for prepaid parcel post—U.S.A. only, local or use tax extra.)

THE MAGNAFLUX Y-5 YOKE KIT



Permits inspection with Magnaflux for surface cracks of all types—quickly and with positive indications. Completely portable; operates from any 115 V. AC outlet, or from a 12-volt car battery. Ideal for off-the-road equipment, or for inspection difficult by other methods.

Note: A similar Kit, the Y-M 5 is also available. It contains Alnico permanent magnets, and requires no power source.

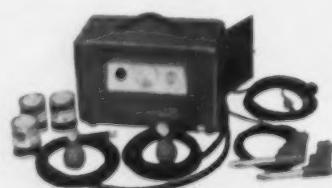


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Electronics Industry Still Growing

West Coast electronics producers will do a \$1 billion business this year . . . Next year they'll do even better . . . There's a growing market for sheet metal tools, dies, castings . . . Future looks bright—By R. R. Kay.

♦ ELECTRONICS MANUFACTURERS on the West Coast will collect over \$1 billion for their products this year. They're sure to do even better in 1956. It's a big industry here, and getting bigger all the time.

Electronics makers are important metalworking customers. Commercial and industrial products use lots of sheet metal tools, diecasting dies, aluminum castings, and consume healthy tonnages of cold-rolled steel sheet. Military products eat up aluminum sheet and other lightweight materials.

Future growth depends on:

1. Companies developing more industrial and commercial business, less military. And they're going after commercial orders with hammer and tongs.

2. Overcoming the dearth of technical manpower.

Firms here are holding their own against midwestern and eastern competition. How so? Western products rate high on quality, style, value per pound. And there's plenty of know-how in local plants—another factor that makes the future look good for firms here.

Here Are Some Details . . . Electronics manufacturers in this area already have a good chunk of the national business. And they look for it to increase in the next few years. Right now Los Angeles alone has 12 pct of the country's electronics firms, 14 pct of the employment and industry billing. Annual payroll is pushing \$300 million for over 72,000 workers in 436 firms, according to H.

Leslie Hoffman, chairman and president, Hoffman Electronics Corp., and chairman of the Los Angeles Chamber of Commerce electronics committee.

Strengthening trend: Many mergers within the industry. Merged companies are winding up with more experienced management and better production facilities. And non-electronics firms are trying hard to get into this growth industry.

Good News For Aircraft . . . A new Pentagon directive will permit higher profits on defense contracts, mainly aircraft manufacture. This is good news to the aircraft industry here, which produces 50 pct by weight of the nation's aircraft. The new directive cancels out a fixed five per cent profit. In its place: An eight pct to 10 pct profit rate.

Jetliner competition between Boeing and Douglas gets hotter by the week. Eastern Air Lines gave its business to Douglas, 26 DC-8's worth \$165 million. Box score: Douglas 95 against Boeing's 55. Other airlines are still on the fence. Their decisions are due any day.

And in San Diego, Convair is rolling right along with its commercial business. The company will finish off and test fly its first Metropolitan model 440 twin-engine transport by year-end. Orders on hand: 58 planes.

Warehouse Sales Up . . . Steel warehouse sales on the West Coast are up 38 pct against 45 pct nationally for the first nine months of this year.

Sales don't compare unfavorably with the rest of the country when you remember that warehousemen here had a higher percentage of sales in 1954 than in the nation as a whole. That's what Robert G. Welch, executive secretary, American Steel Warehouse Association, reports in San Francisco.

New Missile Center? . . . Will Denver become a new guided-missile production center? It begins to look that way. Two big new plants are headed here.

Maryland's Glenn L. Martin Co. is wasting no time launching a big project—500,000 sq ft plant to be finished by early 1957.

California's Ramo-Woodbridge Corp., affiliate of Thompson Products, Inc., says it will start work next year on a 200,000 sq ft unit, presumably also for missiles.



"Doesn't leave any doubts about when coffee break is over does he?"

Never Confuse the No. 8 MARVEL with an ordinary Band Saw

...only the MARVEL is Universal



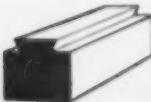
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No. 8 does the
blade remain at
a right angle
throughout its full
18" feed traverse.
Work always re-
mains stationary.



Only on a No. 8 MARVEL
can the saw column be
instantly indexed and
locked at any angle from
45° right to 45° left, and
the saw then fed thru the
work at the desired angle
— without moving the
work.



Only a No. 8
MARVEL can
do all of these
things: Snip-off a $\frac{1}{8}$ "
rod or cut-off an 18"
x 18" cross section



Rough to Size and Shape



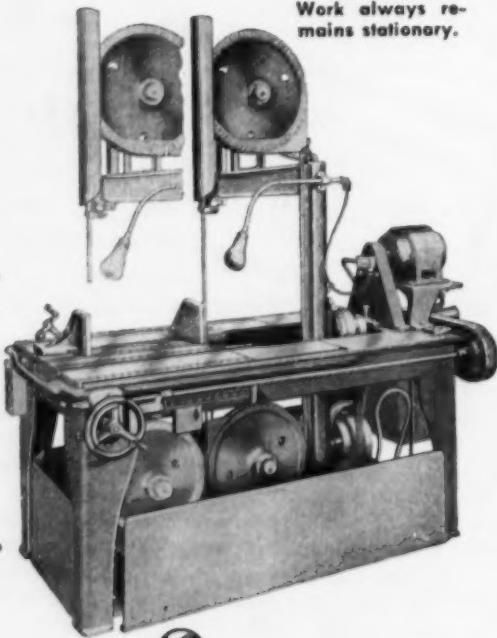
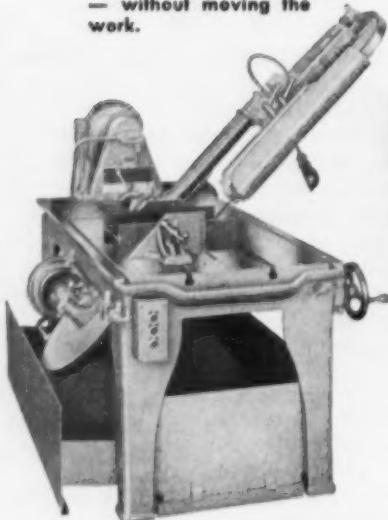
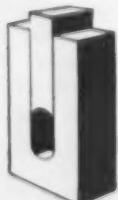
Miter



Index



Cut off and shape
Structural Beams.



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of work of unrestricted sizes and
shapes, special fixtures; Etc.

"Rough Machine" to size and shape with minimum chip waste

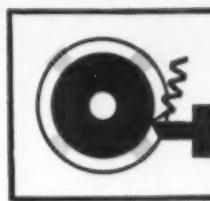
The No. 8 MARVEL is the "busiest tool in the shop" wherever installed because it is a *universal* tool—has both the capacity and the versatility to handle not only standard sawing jobs but innumerable "trick" and convenience jobs as well. More than a metal saw, the No. 8 MARVEL is a fine machine tool with machine tool features like: Both power and hand feeds; Depth Stops; Automatic Blade Tension; Built-in Coolant Pump; Three operating speeds (or six with 2-speed motor). Moisture-proof electrical controls that conform to both "J.I.C." and "MACHINE TOOL" electrical standards; Dirt-proof ball bearings, etc.

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MACHINE TOOL HIGH SPOTS

Imports and Exports Worry Builders

Latest figures show machine tool exports lagging . . . Imports off too but tariff action threatens . . . Inroads by foreign competition would hit defense production, say toolmakers—By E. J. Egan, Jr.

♦ LATEST quarterly report from the U. S. Department of Commerce on the nation's exports and imports of machine tools shows decreases in both categories when matched against comparable 1954 figures.

From April through June this year, exports of metal cutting equipment came to about \$19 million. This is 17 pct less than the \$23 millions' worth shipped out of the country in the like 1954 period.

For metal forming equipment, second quarter 1955 export total of about \$7.9 million was approximately 20 pct under the \$9.9 million reported for the same period last year.

Imports of cutting and forming equipment from April through June of this year produced a combined total of \$3.4 million. This is a 46 pct decline from 1954 when second quarter imports were \$6.3 million.

See Defense Tie . . . Trends in the export-import situation are always of interest to U. S. machine tool builders. Generally speaking, they view both outgoing and incoming equipment as having a definite relationship to the nation's defense preparedness picture.

Despite this year's second quarter drop in imports, builders fear that the situation could reverse itself. One factor that could possibly contribute to an import rise is the Reciprocal Trade Act passed earlier this year. It permits the U. S. to reduce existing import tariffs by not more than 5 pct per

year for three years until 1958.

Another factor is that Executive Order 10582 authorizes the acceptance of foreign bids on government contracts when there is a 6 pct differential in favor of the foreign bidder.

How It Works . . . The Reciprocal Trade Act and Executive Order 10582 are not blanket invitations to a flood of imports, however. Both contain certain "escape" clauses or exceptions which are designed to protect essential national security interests.

Builders have a constant battle on their hands to convince a myriad of government officials, agencies and departments that maintenance of maximum production capacity in the machine tool industry is essential to national security. Any sizable increase in

imports would seriously jeopardize full capacity.

Call Exports Vital . . . On the export side, builders believe that an ever-increasing total of foreign sales and shipments is equally vital to our national security.

The theory is simple: A bigger volume of business keeps productive capacity working at top levels. And, in case of a defense emergency, it's better to have the basic machine tool industry going full blast instead of just limping.

But there are certain barriers to a hoped-for boost in export volume. One is the natural effect of competition from foreign builders operating on familiar home grounds. In many cases, solid nationalistic policies make it extremely difficult for foreign manufacturers to buy anything but tools made in their own countries.

One Way Street . . . Another stumbling block, according to U. S. builders, is the apparent lack of reciprocity in tariff reductions that foreign nations offer in return for U. S. concessions. England, for example, bars the importation of any machine tool if a similar class or kind is produced in that country.

France, also still maintains rigid restrictions against importing U. S. metalworking machinery, although it has relaxed the rules where other nations are concerned. If a French manufacturer wants an American tool badly enough, he must pay about 55 pct more than the list price, plus ocean freight and insurance.



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The Iron Age

SALUTES

J. Gray Somers

His work in the twenties helped carry his company through the thirties. He gets along easily and well with customers and suppliers, does a good job without gritting his teeth.

Two bright decisions enabled Somers Brass Co. to ride out the depression of the thirties in good style. Both were made before anyone knew about the dark days to come.

The first came in the early twenties when young Gray Somers joined his family's company. He was put to work as a truck driver. When he left this job, it was to move into the mill for production and maintenance work. Not until he had been thoroughly schooled in the manufacturing end of the business did he move into sales.

This well-rounded background began to pay off in 1928. At this time, Gray pushed the development of special finishes and alloys in conjunction with big radio companies. As a result of his work, the company came in for substantial radio business in the thirties.

Since that time, Gray has made many contributions to the progress and well-being of the Somers company. He was in on the development of a thin gage brass for lipstick, automatic pencil and similar applications. He has

done an effective selling job, has served since 1938 as company secretary and general manager. He handles a broad workload.

And he takes these tasks easily in stride. His outgoing nature goes well with such jobs as prying loose tight supplies and cementing customer relations. He mixes well, enjoys doing it. There's nothing grim about his working ways and he manages to keep up with many and varied outside interests.

He is an enthusiastic flyer, taking his first lessons back in the twenties. He likes to hunt and fish, will take 2 and 3 week trips into Maine, Northern Vermont and Canada. Some time ago, he bought a jeep with 4-wheel drive for ploughing through the woods. In addition, he plays a fair game of golf and has a complete home workshop. A chandelier he built was written up in a popular mechanics book.

His success indicates the value of solid early training. His manner proves you can do a good job without gritting your teeth if you're in the right job. He is forceful and capable.

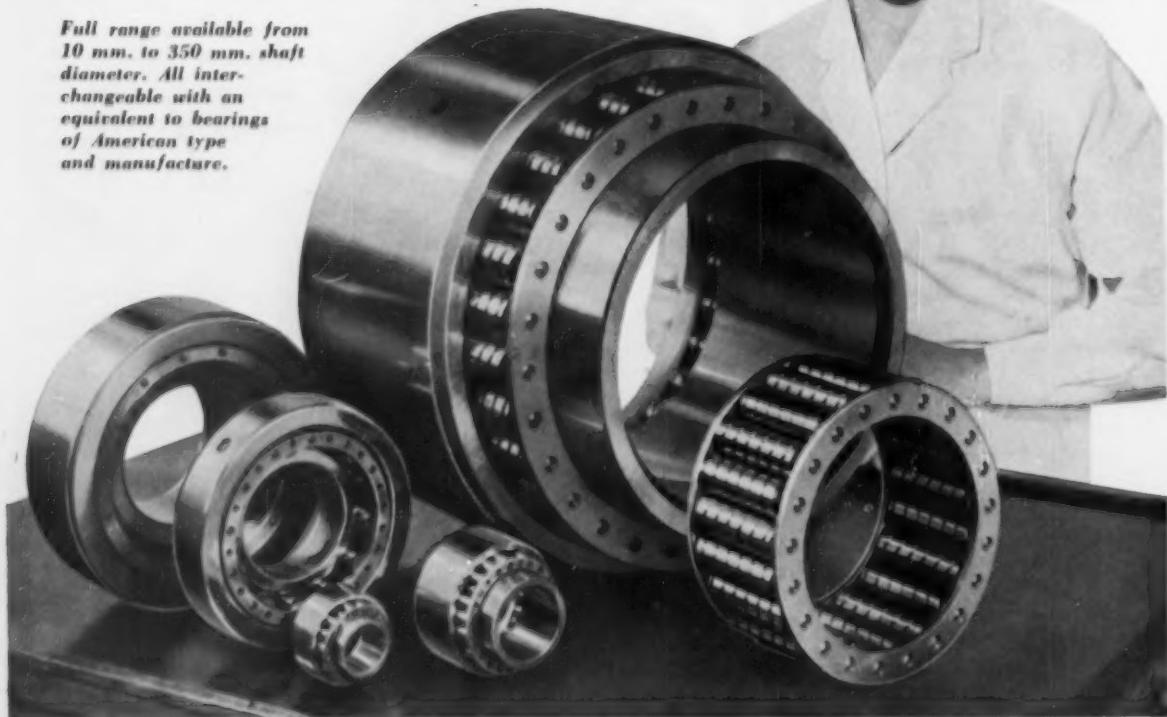
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PERSONNEL



R. J. FERGUSON, JR., appointed assistant vice president, engineering, U. S. Steel Corp., Pittsburgh.



PATTERSON S. WEAVER, appointed chief engineer, project development, U. S. Steel Corp., Pittsburgh.



LAWRENCE L. GARBER, named general manager, Henry Disston Div., H. K. Porter Co., Inc., New York.



EMMETT MANN, elected vice president, H. K. Porter Co., New York.

The Iron Age INTRODUCES

W. C. Whitehead, elected president, **The Garrett Corp.**, Los Angeles.

Jack Clarke, elected executive vice president, **Freestate Industrial Development Co.**, Shreveport, La.

M. C. Patterson, elected vice president and car operations manager, **Dodge**, Detroit; **K. C. Deacon**, elected vice president and truck operations manager.

Harry A. Ehle, elected executive vice president, **International Resistance Co.**, Philadelphia; **Jesse Marsten**, appointed senior vice president.

George A. Bodem, elected vice president, Electronics Div., **Admiral Corp.**, Chicago; **James R. Oberly**, elected vice president, Appliance Div.

Ward W. Clarke, appointed vice president, engineering, **S. P. Kinney**, Carnegie, Pa.; **Hugh B. Carr**, named chief engineer.

Hubert C. Smith, elected vice president, operations, Eastern Div., **The Colorado Fuel and Iron Corp.**, New York.

T. W. Griffiths, appointed general manager, Vinnell Steel, **Vinnell Co., Inc.**, Baldwin Park, Calif.; **Rene Pfister**, named production manager; **Robert V. Lindberg**, named general sales manager.

Frank L. Whitney, elected vice president, engineering, **Walter Kidde Constructors, Inc.**, New York; **E. G. Robbins**, elected vice president, construction.

J. H. Smith, general manager, Central Foundry Div., **General Motors Corp.**, announces appointment of **Robert J. Gleffe** as divisional salaried personnel director; **Dale Wonus**, named superintendent, Malleable Shell Dept., Central Foundry Div., Defiance, O.

Gordon W. Sleeper, elected assistant secretary and assistant controller, Portsmouth Div., **Detroit Steel Corp.**, Detroit.

Francis L. Dabney, appointed secretary and treasurer, **The Bulard Co.**, Bridgeport, Conn.

William E. Haskell, appointed assistant general superintendent, **U. S. Steel Corp.**, South Works Plant, Chicago.

Setrak K. Derderian, elected vice president, **Metal Hydrides, Inc.**, Beverly, Mass.

George A. Tierney, appointed general manager, **McAleenan Brothers Co.**, Pittsburgh; **Joseph L. Haley**, appointed manager, sales engineering.

William S. Long, appointed vice president, operation, **Calstrip Steel Corp.**, Los Angeles.

PERSONNEL

**HEAT TREATING
as an
INDEX**



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F. G. Sorenson

The continuing demand for improved quality in gearing used throughout industry is closely reflected, we think, by the yearly increase in the percentage of our gear output that is scientifically heat treated and specially hardened. This constant pressure for better, tougher, quieter gears carries over into all phases of their manufacture. Gone are the days when a gear was simply any old blank with some teeth cut in it. Even in the past 15 years the change has been dramatic. The necessity to meet steadily increasing requirements in pitch line velocity and stresses has dictated better steels, closer tolerance, more critical tempering and hardening.

Heat treating is, in fact, one of our forte. We have in conjunction with our modern gear manufacturing facilities a complete heat treating plant second to none in the gear industry. Because we are not dependent on outside sources for our heat treating, we obtain obvious advantages in delivery and cost as well as in quality. This is one big reason why we have earned such an enviable reputation for consistently high quality custom gear work, regardless of the requirements. And it is a typical indication of our continuous year-in and year-out efforts to supply gears that meet industry's most exacting demands.

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M. H. Smith, named general sales manager, sales personnel, The Electric Auto-Lite Co., Toledo, Ohio; T. M. Birmingham, named sales administration manager; L. B. O'Loughlin, named spark plug merchandising manager; F. S. Stead, appointed service manager; K. J. Casper, named manager, combined sales offices.

Dr. Wingate A. Lambertson, named assistant to manager, research branch, Research and Development Div., **The Carborundum Co.**, Niagara Falls, New York.

Albert Bauzenberger, Jr., named assistant manager, industrial sales, Philadelphia district, **Pittsburgh Plate Glass Co.**, Pittsburgh.

J. B. Franklin, appointed administrative assistant to manager, **The Electric Auto-Lite Co.**, Syracuse, New York.

George E. Smith, named manager, Mid-Atlantic District, Metallurgical Div., **Kennametal Inc.**, Latrobe, Pa.

Walter R. Bunge, named budget manager, Comptroller's Dept., **Inland Steel Co.**, Chicago.

Henry Risko, named sales manager, Industrial Filtration Div., U. S. Hoffman Machinery Corp., New York.

Dr. S. J. Begun, appointed director, marketing, **Clevite Corp.**, Cleveland.

Joseph A. Cerny, appointed director, engineering, **Bryant Industrial Products Corp.**, Cleveland.

Walter A. Stadtler, appointed director, manufacturing engineering, **International Business Machines Corp.**, New York.

Harold E. Kingsbury, named chief engineer, West Coast Operations, **Chrysler Corp.**, Detroit.

Robert F. Kniffin, appointed assistant industrial engineer, Cleveland Steel Plant, **Republic Steel Corp.**, Cleveland.



L. I. UNDERWOOD, named general export manager, Republic Steel Corp., Cleveland.



DAVID H. BELLAMORE, appointed director, International Projects Div., Republic Steel Corp., Cleveland.



DONALD L. PRICE, appointed sales manager, Grinding Wheels, Norton Co., Worcester, Mass.

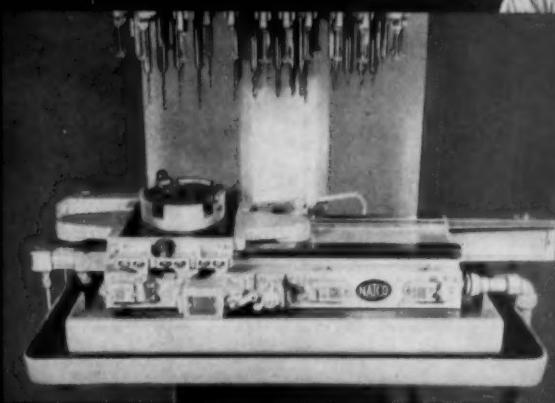


GEORGE A. PARK, appointed sales manager, abrasives, Norton Co., Worcester, Mass.

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Rapid Traverse	Feed Forward	Feed Forward
Feed Forward	Rapid Reverse	Feed Reverse
Rapid Reverse	Index to Position No. 3	Rapid Reverse
Index to Position No. 2		Index to Position No. 1

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PERSONNEL

Norman H. Schwarz, named manager, machine shop, **Greer Hydraulics, Inc.**, Jamaica, New York.

Henry Keep, Jr., appointed manager, Welding Dept., **General Electric Co.**, New Jersey.

Jerry Laine, named manager, Sales Service Dept., **Servel, Inc.**, Evansville, Ind.

George A. Jedenoff, named assistant general superintendent, **Pittsburg Works, Columbia-General Div., U. S. Steel Corp.**; **R. L. Dowell**, named assistant to general superintendent.

Joseph Horacek, Jr., named assistant sales manager, **Turco Products Inc.**, Los Angeles.

Larry A. Pulley, named general sales manager, **Accurate Threaded Fasteners, Inc.**, Chicago.

J. V. Gunter, named district sales manager, southern district, **Baldwin - Lima - Hamilton Corp.**, Lima, Ohio.

Harry E. Connors, appointed general manager, railroad sales, **National Bearing Div., American Brake Shoe Co.**, Chicago.

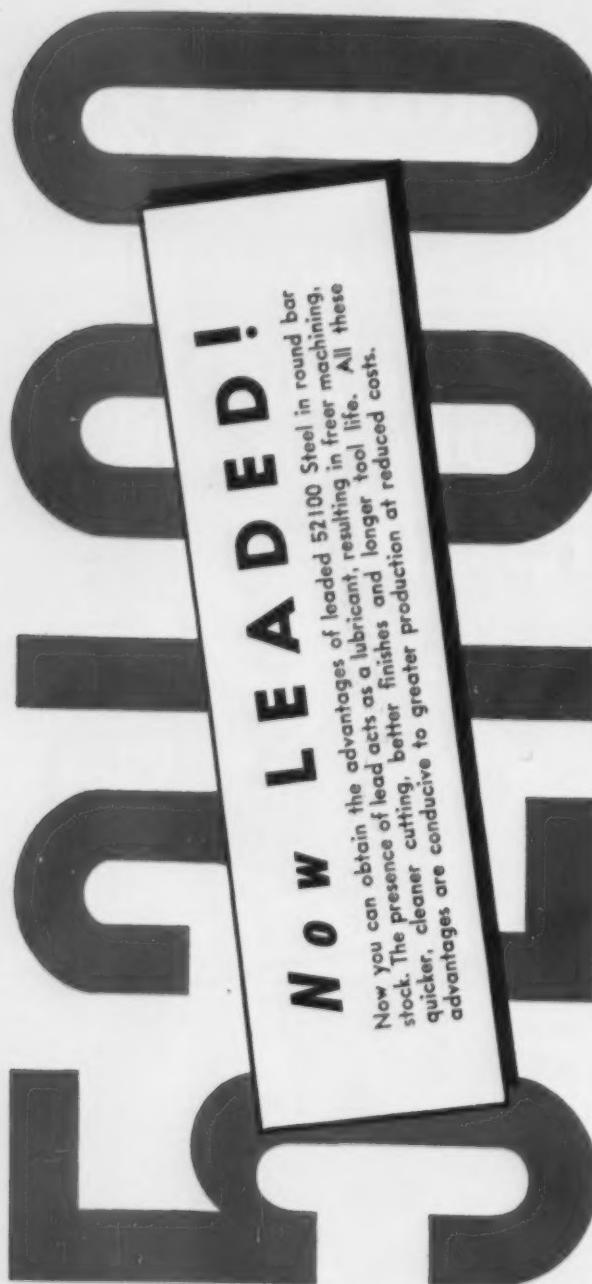
A. W. Anger, named director, manufacturing, **Axelson Manufacturing Co.**, Los Angeles.

Ralph E. Fritzsche, appointed district application engineer, Youngstown, Ohio office, **Clark Controller Co.**, Cleveland; **George J. Lawson**, appointed district application engineer, New York office.

Clarence Wantz, appointed chief engineer, Engineering Dept., **Robertshaw Thermostat Div., Robertshaw-Fulton Controls Co.**, Youngwood, Pa.

Russell M. Fowler, named chief industrial engineer, Harris Div., **Harris-Seybold Co.**, Cleveland.

Ray A. Hulce, named general purchasing agent, Lincoln Div., **Ford Motor Co.**, Dearborn, Mich.

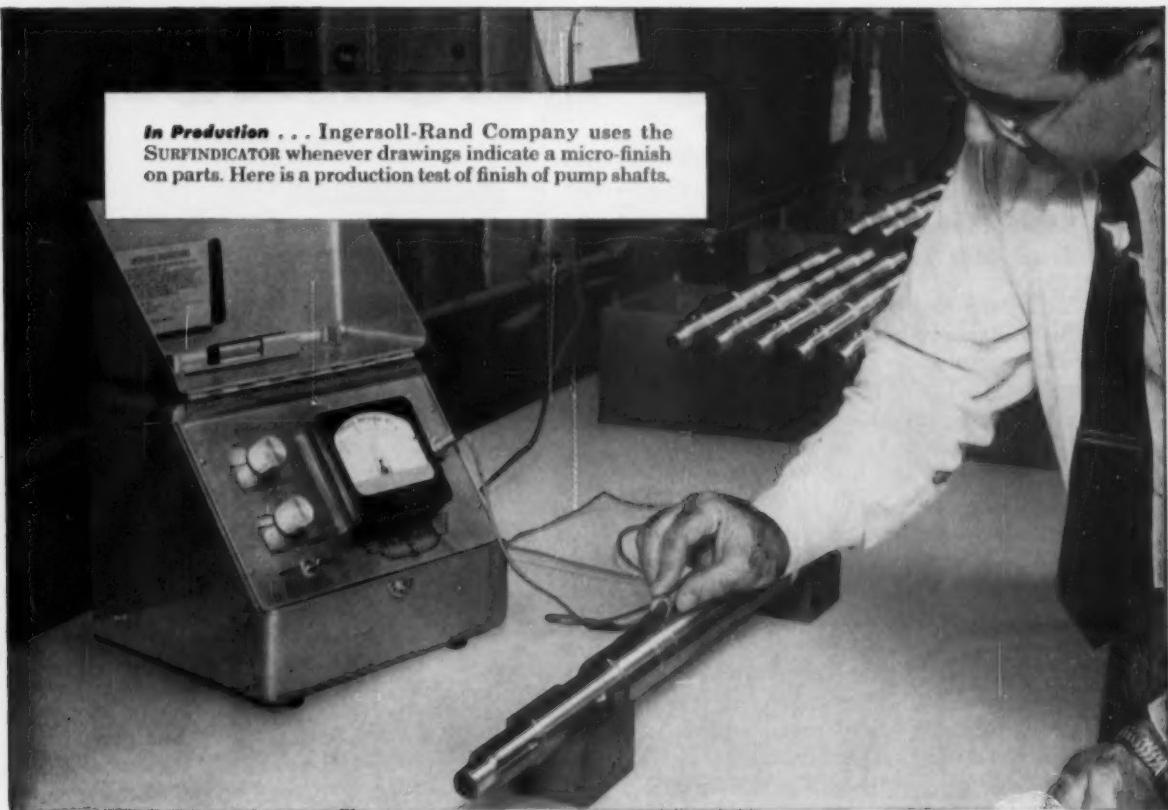


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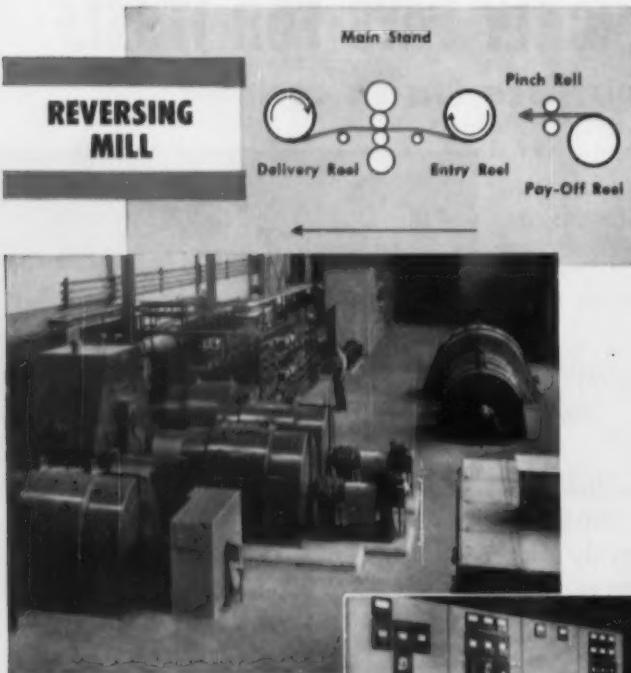
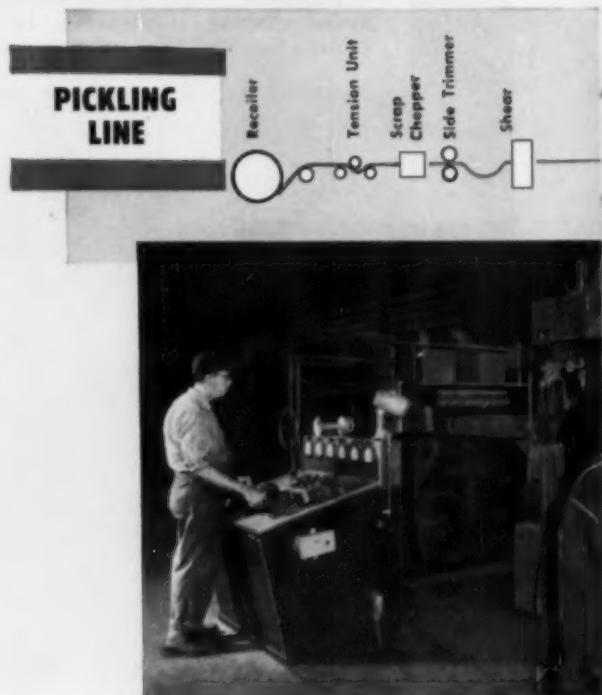
Demand for specialized steel remains at a record high. Steel producers are meeting the challenge with improvements on existing processing lines, or installation of new facilities for pickling and annealing operations.

A recent installation of this type in an eastern steel mill featured Allis-Chalmers motors, m-g sets, control and operating stations, and switchgear throughout.

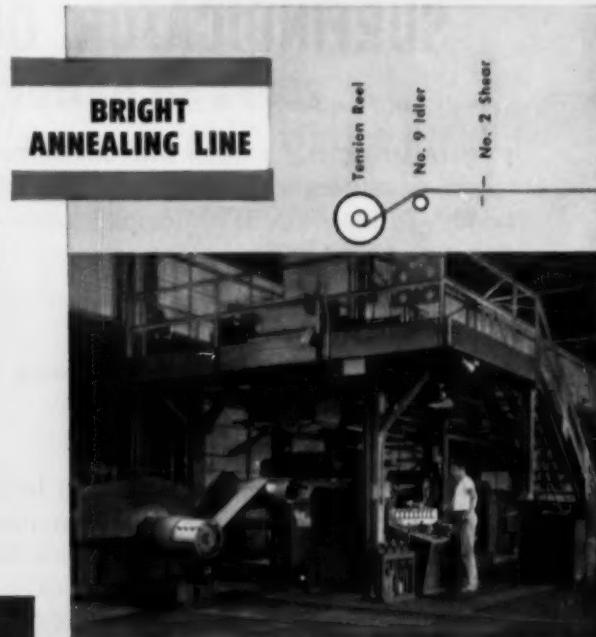
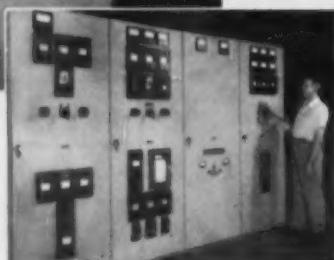
Allis-Chalmers equipment was chosen for this duty because of its record of quality, economy, durability . . . proven in years of heavy-duty steel mill operation.

Take advantage of Allis-Chalmers wide range of equipment and service. For help in planning new facilities or modernizing present plants, contact the A-C office in your district, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4872



Overall view of new reversing mill motor room showing main motors, m-g sets, control, and 11,000/480-volt substation. Inset shows Allis-Chalmers 15-kv high voltage switching equipment for the motor-generator set and substation.

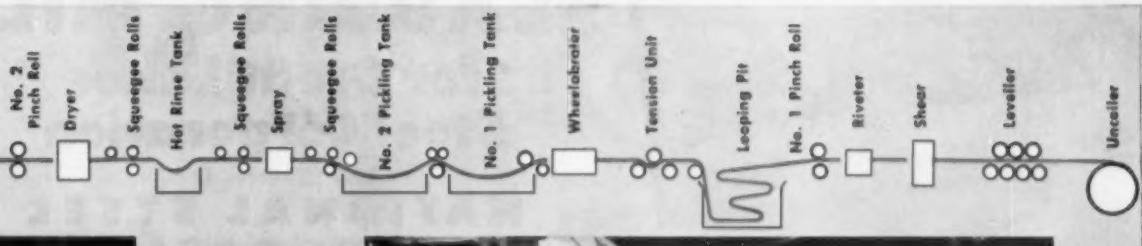


Delivery end of new annealing line. Allis-Chalmers desk-type operators' control stations, as shown here, are used throughout these modern new facilities.

ALLIS-

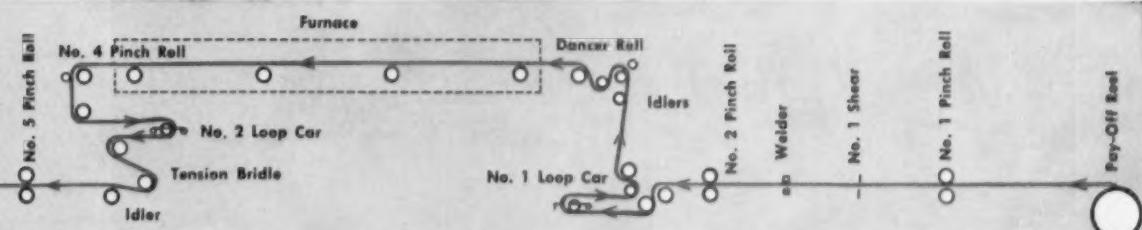
THE IRON AGE

... All Along the Line

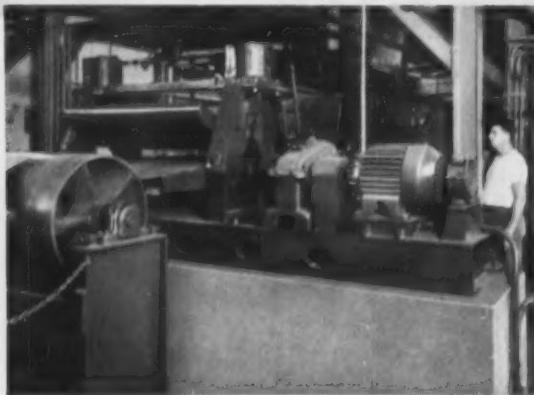


Operator's station, entry end, 36-inch hot-rolled pickling line. Allis-Chalmers control, initiated from desk, gives positive, precision control of material speed.

Allis-Chalmers dc control board and metering panels, m-g set, on delivery section of the pickling line.



Allis-Chalmers m-g set and dc control board on the annealing line. Allis-Chalmers m-g sets and controls are recognized in the steel industry for dependable, economical service.



Pinch roll drive on delivery end of annealing line. Allis-Chalmers fan-cooled motors drive various parts of the processing line.

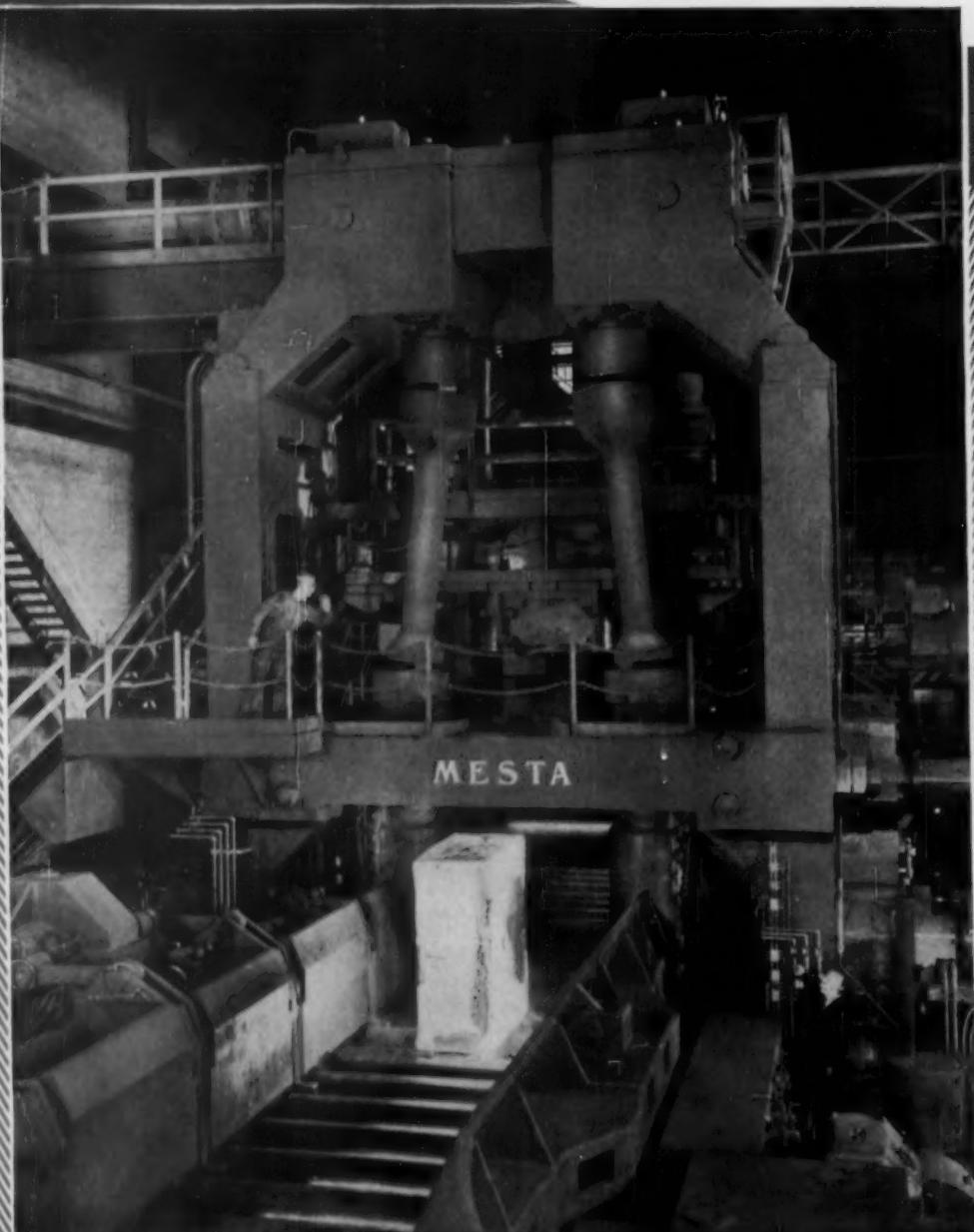


CHALMERS

Designed and Built by
MESTA

Rolling 20 Ton Ingots into Slabs on a Mesta
45" x 90" Universal Reversing Slabbing Mill

SLABBING MILL
for Great Lakes
Steel Corporation
DIVISION OF
**NATIONAL STEEL
CORPORATION**



DESIGNERS AND BUILDERS OF COMPLETE STEEL PLANTS

MESTA MACHINE COMPANY • Pittsburgh, Pa.

Halves paperwork—

Iron Age
FOUNDED 1855

TECHNICAL
ARTICLES

Punched Cards Control Production Scheduling

♦ ORDERING, scheduling and controlling of parts in process is often a problem in metalworking plants. Installation of a tabulating card control system may be an effective solution.

Use of such a system at one machine tool plant has greatly reduced paperwork in the shop. And the time required for keeping track of orders in process has been sliced in half.

Flexibility of the system makes it feasible to gather information practically impossible to determine by prior manual methods.

Handling of paperwork rapidly improved in efficiency with introduction of a tabulating card system at the Norton Co., Worcester, Mass. The earlier workload, processed manually, required 20 more workers than are now needed with use of tab cards.

One set for each machine

Here's how the system works. Every machine built by Norton has a corresponding set of master tabulating cards. The set includes a punched card for each part, for each step in manufacture and for each trucking operation. The system was created in cooperation with engineers at International Business Machine Corp.

Assume a precision grinding machine of a group of identical grinders is to be built. The master set of cards detailing the machine's manufacture is rifled through an IBM duplicator. A duplicate set of cards is punched for each part in the machine under construction.

Number of cards for each machine varies according to design complexity and number of manufacturing operations. All information

♦ Keeping track of in-process parts is a simple and foolproof matter with this tabulating card system . . . Paper work in ordering and scheduling of parts is cut in half.

♦ Punched cards carry all necessary production information . . . No multiple copies are needed . . . System is best used where design is relatively stable.

concerning a Norton semiautomatic cylindrical grinder, for example, is carried by punched holes on about 600 tab cards.

Individual parts may be in stock, or be in process for stock. They may have been ordered earlier from suppliers, or may have to be turned out in the shop. Checking the duplicate cards against master inventory cards tells the story.

Inventory cards provide a printed record of the inventory situation on the parts required. The inventory control man can tell at a glance if parts must be ordered, or can be taken from stock—either in stores or in process of manufacture.

Parts to be ordered or manufactured are requisitioned in the most economical lot size. Those in stock needed for the machine under construction are reserved with a special punched card.

Duplicate card packs are prepared from the master file for each machining operation on every component. The appropriate engineering drawing and a schedule of operations are

attached to complete the needed information.

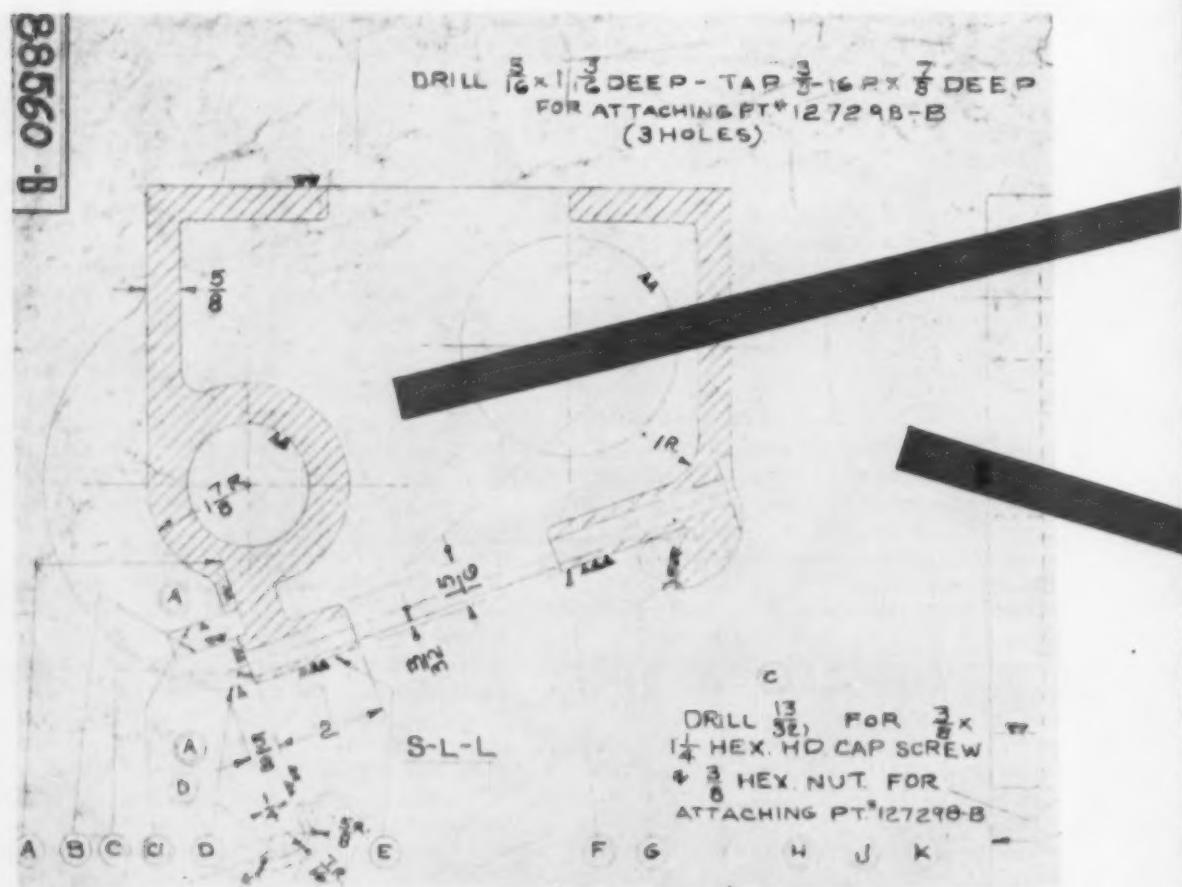
Each operation card lists a scheduled date of completion for the part. A summary card carries a progress record on each operation. Still another card is punched with correlated information on completion date of all the parts, in order that a final delivery date of the assembled machine may be planned.

This last schedule is prepared and correlated with the help of punched cards. It is devised to fit between other manufacturing operations already scheduled to take best advantage of available machines and manpower.

The punched cards, blueprint and schedule are handed the foreman in charge of the line manufacturing the part. He then allocates them among his men. As each completes the assigned manufacturing operations, he passes the part along to the next operator and turns in his punched cards. There is no doubt of part number, setup, number of pieces needed or estimated hours required. All are punched on the card and printed at its top.

Cards are turned in daily by machine operators for determination of pay. Each operation is rated and the man is paid accordingly.

Punched requisition cards are used to draw raw materials, rough castings and component



RUNNING INVENTORY record printed at hundreds of parts a minute from punched tab cards.

parts. The schedule of operations calls attention to items that must be requisitioned.

Truck operators move parts between manufacturing operations only on the authorization of punched cards.

After completion of operations specified on

the punched cards they revert to the production control department. This makes possible location of work in process almost immediately. A quick check shows what point the work has reached by the latest card in the hands of production control.

Use of the cards frees the foreman of needless paper shuffling in keeping track of work in progress. It enables him to really do the job he was hired for: that of supervising. There is no longer a need for a timekeeper in each department. Human clerical error is practically eliminated, since there is no opportunity for it to creep in.

Inventory downtime is practically non-existent as a production bottleneck. Master inventory cards are merely run through an automatic lister at regular intervals. The machine prints a detailed list of each part in inventory, including its part number, manufacturing cost, yearly turnover in inventory, location in storage and other pertinent information.

The IBM system for production control is essentially a mechanized double-entry book-keeping system with many added advantages. Properly used, a tab card system saves time and money in manufacturing parts and assembling machines. It shortens the time required

to process orders for repair parts, including those going to customers who desperately need a small but essential component. It makes possible a wide range of by-product advantages which show up clearly in surveys of manufacturing operations.

For such a system to be practicable, there must be: 1) repetition in ordering. 2) a relatively stable design of the product. There are no savings in a one-shot job. But, in building such a machine as a precision grinder, savings may well be expected to appear on the third or fourth machine completed.

Inherent speed and simplicity of tabulating card controls may be sufficient recommendation for its use in many production departments. Often a separate machine installation for production control is unnecessary. The machines already employed in another department (sales, accounting, comptrollers or market research) may be suitable with addition of control panels. The panels are easily set up and simply inserted in the machine when a production control job is scheduled.

Sorters, listers and other tab card equipment work 24 hours a day at negligible added cost, so there is seldom a problem of insufficient free machine time.

OPERATION ROUTING

Series No. 5-1956-A	Mach Type	6" CTU	Pre	Part Number	Lot
			<u>11</u>	88560-B	<u>+</u>
Foundry			Check No.		
Name Body			Methods Std. No.		
Oper No.			Dept. No.		
			Painting 88560 Wash and clean for painting and machining.		
			11		
			Painter		
			Inside: Spray with oil proof seal.		
			Outside: Prime, fill, rub and seal.		
			17		
			2 - Vertical Mill		
			Mill A - B = G - C - S - E - F - G. 7-44687 Milling		
			Fixture. 7-90733 Ang. Cutter. 7-44875 Form Cutter.		
			7-49656 Template. Each body to be set with target and use of 1/4" feelers.		
			24		
			3 - Horizontal Mill		
			Mill E. Note J-3/16" dim. on other end. 7-74151 Table Section.		
			26		

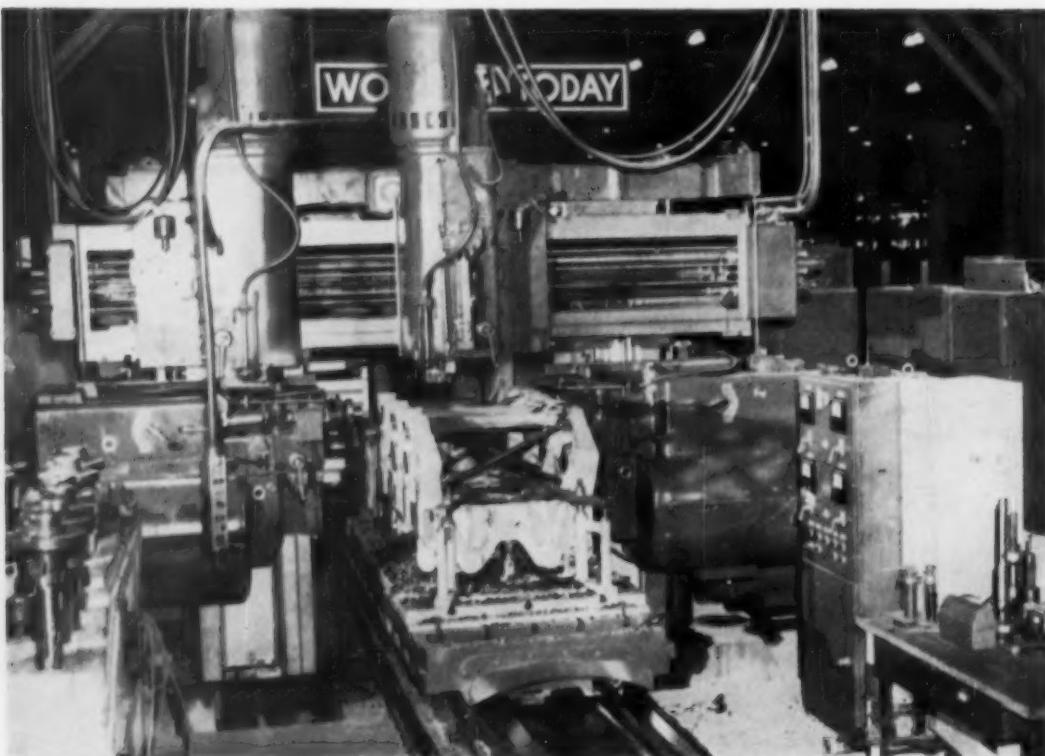
SECOND MACHINING OPERATION on headstock body is detailed on operations sheet, left, and blueprint section, far left. Punched card below, one of 25, lists operation, part number, setup, number required, finished date and standard time. Remaining cards include those covering eight other machine operations, between-machine trucking and part requisitions.

PART NO.		CHECK OR ACCT. NO.		PART NAME		DATE		TIME EACH		TIME EACH		PCN ORD.		IN SITE		ALL R. HOURS	
ITEM		LOT NO. OR PLT. GRD.		WORK CENTER NO.		FOR DEPARTMENT		PLANT NO.		BILL NO.		ITEMS OR SCHED. NO.		JOB NO.			
DEPT. NO.		OPEN NO.		ALCANT.		S. OF TIME		REGD EQUIPMENT AND SUBDIVISION									
PCN REC'D.		ALCANT. NO.		ALCANT. NO.		1		1		1		1		1		1	
SET UP		TIME EACH		CODE NO.		DATE		ISSUED BY		WRITTEN BY		APPROVED FOR PAYMENT				2	
ACTUAL HOURS		ALLOWED HOURS		DESCRIPTION OF WORK		4		4		4		4		4		4	
WEEK ENDING		LABOR COST		LABOR AND BURDEN		5		5		5		5		5		5	
						6		6		6		6		6		6	
						7		7		7		7		7		7	
Failure to turn in labor card within 24 hours after work is completed is sufficient cause for dismissal from the Company.																	
PART NAME		CLOTH NO.		DEPT. NO.		OPEN NO.		CLOTH NO.		DEPT. NO.		OPEN NO.		ITEMS NO.		PCN NO.	
MASTER CARD FIELDS																	

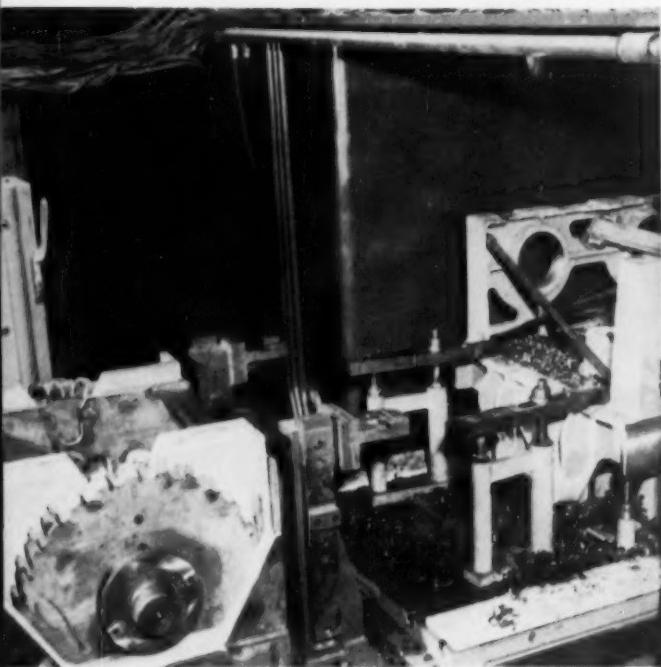
Production line speed—

Special Planer Mills Intricate One-Ton Castings

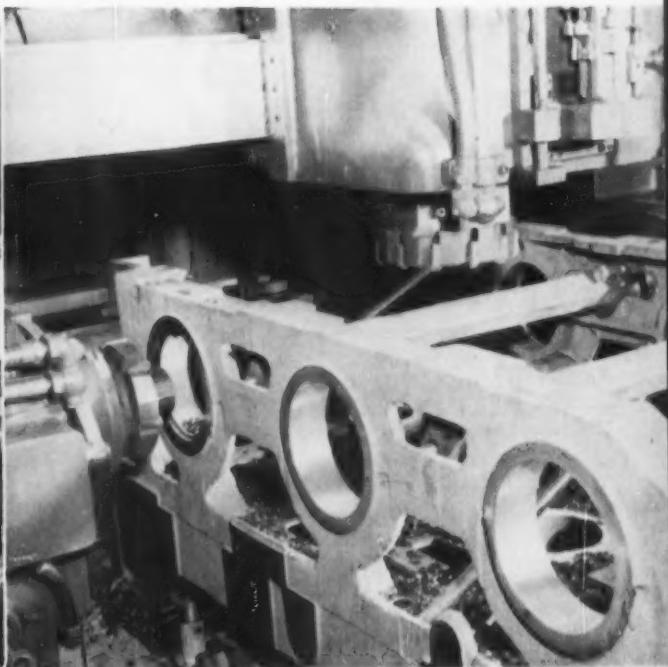
- ♦ Castings weighing 1900 lb and more are rough and finish machined in a multiple series of operations on one specially built machine . . . Two coordinated horizontal milling heads work with two vertical heads to minimize production costs.
- ♦ Twenty-two in. diam cutters simultaneously face more than 3 sq ft of casting surface . . . High-strength casting later houses heavy-duty gear trains driving excavator cranes.



TWIN horizontal and twin vertical cutting heads perform all milling operations on this 1900 lb casting, part of an excavator crane.



PARALLEL 22-in. diam carbide-tipped cutters saws remove stock on both sides simultaneously.



BORING tools finish six gearshaft mounting holes in pairs, then face each hole.

◆ MAXIMUM production economies in machining intricate one-ton castings are made possible by a special milling machine of unusual versatility. The planer-type machine mills box-like castings around which the structural parts of excavator cranes are subsequently weld-fabricated. The casting supports the heavy-duty gear train driving the crane.

Smallest casting weighs more than 1900 lb, and is mounted in cranes of $\frac{3}{8}$ -yd capacity. Castings for $\frac{1}{2}$ - and $\frac{3}{4}$ -yd cranes are also finished on the same machine.

Two horizontal and two vertical spindle milling heads operate in smooth coordination to complete rough- and finish-milling operations in minimum time. The special machine was designed and built by G. A. Gray Co. for use at Construction Machinery Division of Clark Equipment Co., Benton Harbor, Mich.

Each casting is clamped to a fixture bolted on the machine carriage. The carriage traverses along heavy horizontal ways. The vertical milling heads are bridge-mounted and move at right angles to the carriage.

Initial cuts are made along longitudinal sides of the casting using two 22-in. diam cutters, mounting inserted carbide blades. Both cuts are made simultaneously. As the casting traverses between the cutters, it is straddle-milled along side bosses. Approximately $\frac{3}{16}$ in. of stock is removed in the first cuts.

The 22-in. diam cutters are too unwieldy for

manual handling, and are set in boxes that can be positioned readily. These hold the cutters while they are installed and removed from the driving spindles and when the cutters are not in use.

When these cuts are completed, vertical quills carrying 10-in. cutters are lowered. Each mills off pads on the top faces of the two side struts of the casting.

In the third operation, boring cutters are mounted on the vertical quills to rough- and finish-bore vertical holes in the casting top surfaces. These include one pilot shaft hole and a bearing hole. Diameter of the latter is held within 0.0009-in. tolerance. Bushings guide the spindles in making these cuts.

Side facing cutters are then removed. Boring cutters are inserted on the side spindles to bore six large holes, three on each side in which gear shafts are later mounted. Holes are bored in opposite pairs in three operations. Each hole is faced with the same setup.

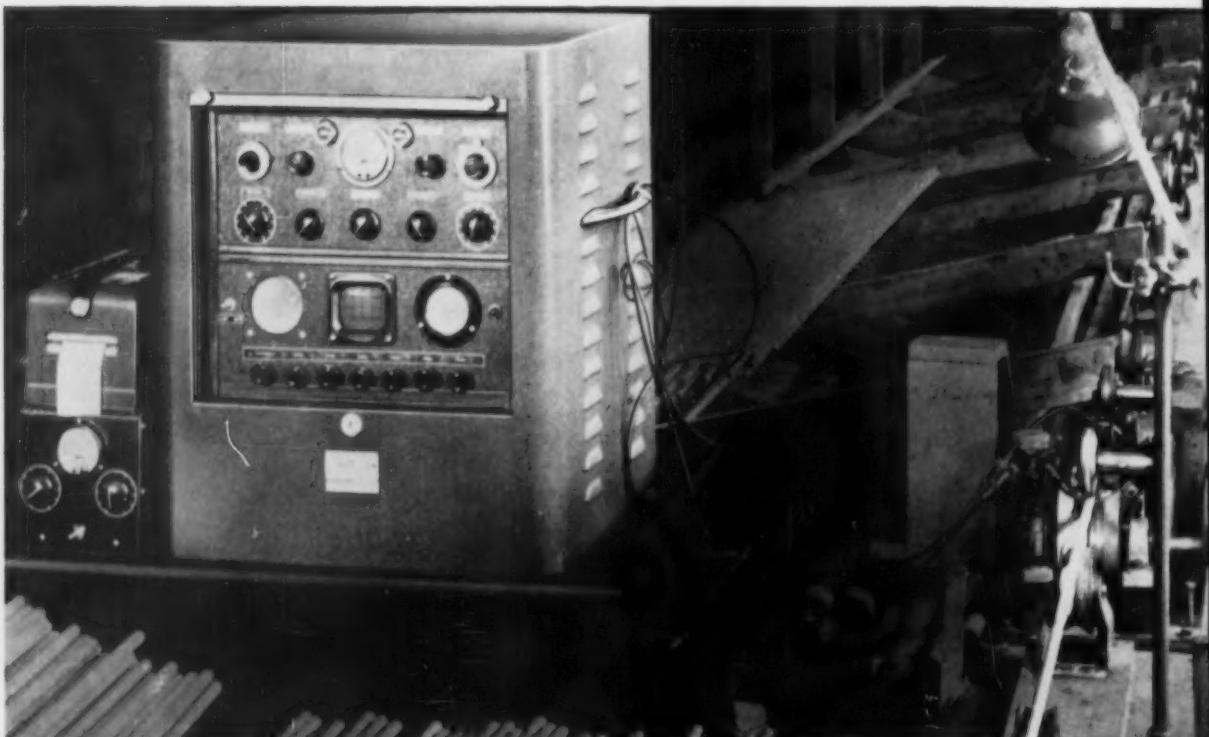
After all operations on the milling machine are completed, the casting is removed by an overhead crane. It is turned over and mounted on the bed of a boring machine. Tools installed on the horizontal boring bar of this machine bore end holes in the casting and face the bosses at the outer ends of these holes.

Subsequently, the casting is transferred to an automatic welding machine where a heavy plate is welded to each side face.

Highly accurate—

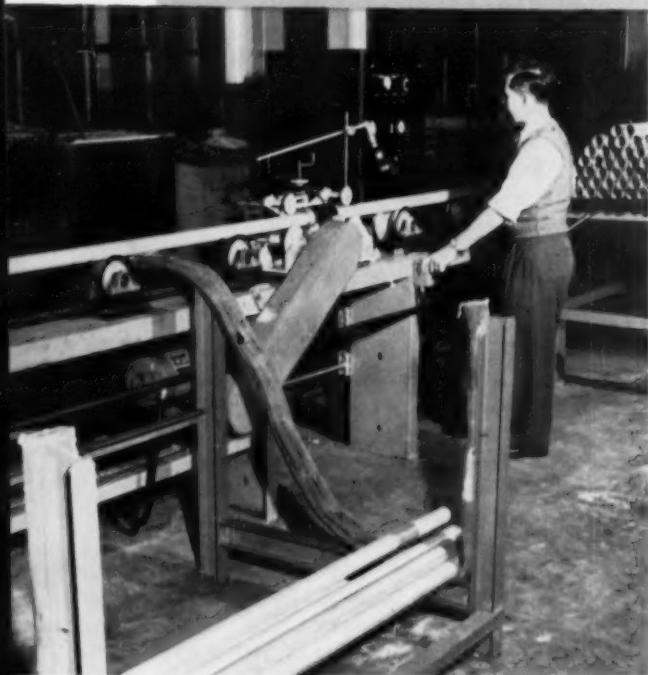
High-Speed Unit Performs Three-Way Inspection

- ◆ Continuous electromagnetic analysis of non-magnetic or paramagnetic materials now appears feasible at speeds in excess of 300 fpm . . . Flaws 0.004 in. deep already are being spotted at 250 fpm in 16-gage stainless tubing.
- ◆ Nondestructive technique is more sensitive, reveals more information than previous methods . . . Tubing and bar stock are 100 pct inspected for chemical composition, presence of defects and correct dimensions.



ANALYSIS by oscilloscope verifies chemistry, detects flaws, checks tubing dimensions.

HIGH-SPEED analysis of tubing by magnetic technique detects flaws as small as 0.004 in.



♦ AUTOMATIC detection of flaws less than 0.004 in. deep in nonmagnetic bar stock and tubing at continuous speeds in excess of 300 fpm is just around the corner. Already several companies are magnetically inspecting and testing stainless steel tubing at speeds averaging 250 fpm. Stainless bar stock up to 3 in. diam also is being inspected in other plants at comparable speeds.

Development work already underway indicates that the nondestructive, continuous magnetic technique may be applied to a variety of nonmagnetic materials.

Inspects near instantaneously

By means of continuous magnetic testing: 1) all material is 100 pct inspected, 2) chemical composition of stock is verified, 3) flaws are detected, and 4) dimensions are checked, including wall thickness, inside diameter and outside diameter of tubing.

All this takes place almost instantaneously as the bar stock or tubing passes through a magnetic field at high speed. The inspection process does not require stopping or even slowing the material under test.

Earlier magnetic testing work concentrated

on detection of flaws, and deliberately ignored for the most part variations in chemical composition, metallurgical structure, stress concentrations and magnetic permeability. Such equipment was inadequate for all production testing. The smallest flaw that previous experience showed to be universally detectable was $\frac{1}{16}$ -in. long and 0.032-in. deep, lying within $\frac{1}{16}$ -in. of the surface.

Detected flaws to 0.070-in. depth

First installation of the equipment in a tube mill was recently reported at Alloy Tube Division of The Carpenter Steel Co., Union, N. J. There the inspection process is used to check stainless steel tubing $\frac{1}{4}$ -in. to 3-in. OD. Inside and outside surfaces of the welded tubing are continuously tested along the full length and around the entire periphery. Sub-surface of the material is inspected in tubes with wall thickness up to 0.070-in. Thicker tubes are inspected under certain conditions.

The Baltimore plant of Armco Steel Corp. also is using the process in the first such installation in a bar mill.

Equipment in current use handles stainless steel stock up to about 3-in. diam. A recent order has been placed by Allegheny Ludlum Steel Corp., Pittsburgh, for coils permitting inspection of $3\frac{3}{4}$ -in. stock. The firm already has two installations at its Watervliet, N. Y. plant, one for inspecting extruded tubing, the other for testing bar stock.

The nondestructive testing method employs a magnetic field created by encircling electrical coils that permeates the non-magnetic material under inspection. Variations and eddy currents in the material may be interpreted by oscilloscope to reflect divergences from standards that require rejection of the material.

On high-speed inspection lines, possibility of human error is eliminated by use of automatic alarm circuits. These alarms are tripped when the pulsating voltage induced by the varying magnetic field strays too far from the standard. In such equipment, the oscilloscope is a secondary source of information, used mostly for adjusting and setting the instrument.

Equipment of this type manufactured by Magnetic Analysis Corp., Long Island City, N. Y., calls operator's attention to defective tubing and bar stock by means of a blaring horn and flashing lights.

As the bar stock or tubing passes through the magnetic coil, the equipment detects variation of the material from acceptable chemical compo-

"It is possible to differentiate between even closely related alloys, traveling within inches of one another . . . identical in size, gage and over-all appearance."

sition. The exact circuitry by which this is accomplished has not yet been revealed, but it is understood to involve automatic interpretation of voltages reflecting variation of the material's electrical conductivity from an established standard. By this means it is possible to differentiate between even closely related alloys traveling within inches of one another.

Where a dozen or more stainless alloys are being processed in the same plant to the specifications of as many customers, continuous electronic testing is used to separate one order from another. A run of AISI 304 tubing may be followed within inches by an order of AISI 316 tubing, identical in size, gauge and over-all appearance. The instrument readily detects that the following lot is not AISI 304 and trips an alarm circuit which notifies the inspector.

Quality control of tubing and bar stock is easier and more reliable with the new equipment. Tubing less than $\frac{1}{2}$ -in. OD is being 100 pct inspected by the method at Carpenter Steel. Previously visual inspection was used, a difficult and time-consuming operation on such small sizes.

The magnetic field will detect minute flaws invisible to the unaided eye, even those undisclosed by hydrostatic test. It will detect such critical defects as: 1) notches, 2) weepers, 3) carburization and gouges on the inside diameter of tubing, 4) mechanical defects caused by abusive handling, and 5) imperfections in the parent metal.

A sensitivity control facilitates adjusting the instrument to indicate defects of a pre-determined magnitude. Duplicate dial settings are used to speed and simplify inspection of duplicate orders.

Eliminates other inspections

Future development of the continuous magnetic analysis technique and its equipment may make possible restricting or even eliminating many conventional inspection procedures, including inspection by visual means, or with pressure testing, fluorescent penetrant, ultrasonic, X-ray or gamma ray equipment. Design of a portable unit for continuous magnetic analysis in the field is quite feasible.

Flaws down to 0.004-in. deep are now being detected on a production line basis in 16-gauge stainless tubing with a wall thickness of 0.065-in. The thinner the tubing wall, the smaller are the flaws that may be detected.

In 0.065-in. thick tubing, inside diameter defects down to 3 pct of the wall thickness are

reportedly being detected with the inspection equipment. In material of 0.083-in. wall thickness, defects forming five to six pct of the wall thickness are found. Above 0.1-in. thickness, flaws spanning nine to 10 pct of the wall may be picked up.

The preceding inspection standards apparently include all flaws within the given dimensions considered metallurgically significant. They indicate that the continuous magnetic analysis technique approaches or exceeds the accuracy possible with other inspection methods.

Training in technique

Major limitation of the technique at its present stage of development would appear to be astuteness of the inspector in interpretation of curves and patterns on the oscilloscope tube. However, differences in opinion among inspectors are largely eliminated by application of electronic devices to measuring deviation from the standard. To use the equipment, inspecting personnel require little training and experience beyond that for visual inspection.

In the inspection departments of plants now using continuous magnetic analysis, the inspectors themselves set up the equipment for each batch of bar stock or tubing being tested. They are responsible for the entire process, including adjusting the oscilloscope dials to trip alarm circuits when an unacceptable defect is detected.

Training in application of the technique is nominal. Normally the inspector-to-be undergoes an intensive, week-long session in theory and application of the inspection method. Practical experience in interpretation of varieties of defects during this time help prepare the man for the high-speed inspection process.

Materials capable of magnetism only under certain conditions (i.e., paramagnetic materials) may offer problems in inspection by this technique. Some austenitic stainless steels present such difficulties. Where these steels undergo considerable cold-forming in manufacture, their magnetic permeability alters sufficiently to disturb the magnetic eddy currents created during inspection. Heat treatment will normally restore such metals to a nonmagnetic condition.

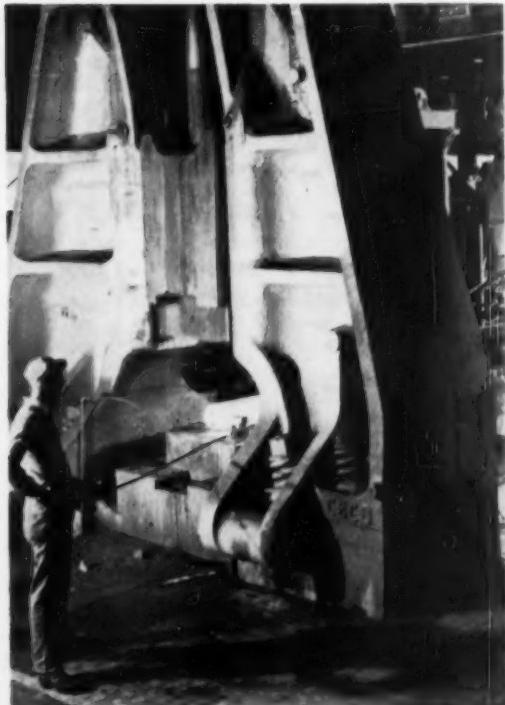
Nomagnetic (or paramagnetic) stainless grades with a permeability of 1.05 are easily inspected by this method. Continuous magnetic inspection equipment functions at a high degree of efficiency provided the magnetic permeability does not vary beyond a value of 1 and approximately 1.6 within a space of 2 in. to 4 in. along the length of the tube.

Rolling, Forging Facilities Meet Diversified Needs

♦ A metals pilot plant charged with developing better metallurgical products and processes can't know what it may be called upon for tomorrow, next month, next year . . . One answer lies in choosing adaptable, multipurpose equipment.

♦ Here's how rolling and forging facilities at Westinghouse's new Blairsville Metals Plant were fitted in with this equipment philosophy . . . Facilities permit a wide range of developmental and production work.

By R. C. HUMPHREY,
Materials Manufacturing Department,
Westinghouse Electric Corp.,
Blairsville, Pa.



FORGE HAMMER drops onto ingot. Special 18,000 lb hammer handles open and closed die work; is so well shockproofed that two banks of furnace instruments can operate within 20 ft of it.

♦ PILOT PLANT effectiveness depends in good part on how closely the plant approaches actual production conditions. Setting up full-sized equipment would be ideal. Yet few companies can afford the luxury of commercial-sized facilities for development work alone.

Westinghouse Electric Corp. solved the problem, in planning its recently opened Blairsville Metals Plant, by combining development work on special alloys and processing techniques with limited production operations. Thus development costs are offset to some extent and trained operating crews are provided. Also, commercial-sized, flexible tools which could not be fully utilized on development work alone can be loaded to reasonable levels.

Specialty items only

Included in the 173,000 sq ft plant are facilities for carrying on development work in shell-mold and investment casting, powder metallurgy, melting, heat treating, forging and hot and cold rolling. Production operations are being limited to smaller specialty items which can be produced at competitive costs. Forging and rolling facilities provide a good illustration of this dual-purpose role.

Equipment in the forge section permits production of a wide range of gear blanks, rings, shafts, hot-forged plane sections, short extrusions, impression die forgings and general cogged shapes.

Of particular interest is an 18,000-lb special forge hammer designed for both open and closed die work. This was built to Westinghouse design by Chambersburg Engineering Co., and is basically a drop forge hammer with side frames attached directly to a one-piece, 160-ton anvil block. Main difference from a fully-guided drop hammer design is an opening five feet high and six feet from left to right around the anvil. This provides sufficient space for working with a manipulator or levers during regular cogging or ring-forging operations.

For closed-die forging, an adapter plate 10 in. thick is keyed to the top of the sow block. This raises the average die line to 41 in. and allows the hammer to strike a 90 pct guided blow. Initial closed-die forging operations on a 36 in. steam turbine blade show that a high degree of die match can be achieved. Hammer forging of a 44-in. blade will be tried when the technique has been further developed.

Close tolerances held

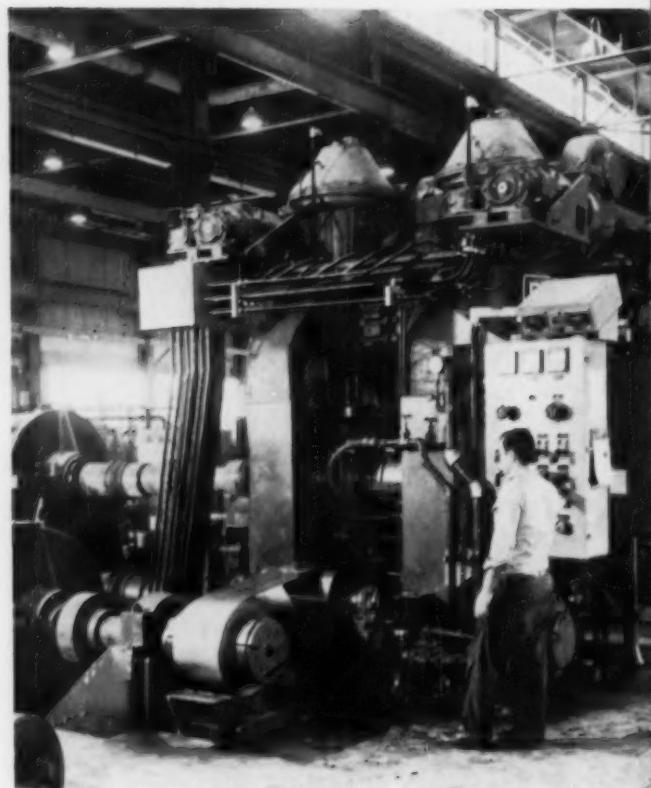
Tolerances with $\pm 1/16$ in. in a 4-in. square have been held with this equipment. The hammer can be either lever or treadle operated, in keeping with both types of forging.

To solve the problem of vibration and shock from such a sizable hammer, Westinghouse enlisted the Raymond Concrete Pile Co. and Fabreeka Products Co. for consulting services in foundation design. The result is a massive 300 cu yd block of reinforced concrete resting in 12 ft of solid rock, and topped by 3 $\frac{3}{4}$ in. of Fabreeka shock-absorbent material on which the anvil rests. The design eliminates all timbers. It has proved so satisfactory that two banks of instruments for heat treating and forging furnaces can operate within 20 ft of the installation.

Other equipment contributing to forge section flexibility include a 1000-ton steam hydraulic forge press, a 6000-lb double-frame forge hammer, a 4000-lb single frame forge hammer, and an 800-lb single frame blacksmith hammer. Ingots weighing up to 6000 lb can be handled by the forging section.

Heating capacity is provided by two large single door and two smaller double door forge gas-fired furnaces. These are placed to serve both the 18,000-lb hammer and the 1000-ton press. Smaller hammers are served by one double-door and two single-door furnaces, together with a small blacksmith furnace and a blacksmith hearth. Handling of heavy sections to and from furnaces and during operations on the large hammer and press is accomplished by a 6000-lb Salem-Brosius Auto-floor Manipulator.

Choice of equipment for sheet and strip rolling operations presented a similar challenge. Electrical industry requirements are such that considerable emphasis had to be placed on facilities for rolling thin gage strip to very close tolerances. Combined hot and cold-rolling equipment



COLD-ROLLING mill is of especially sturdy design, capable of rolling through the range of 0.020 to 0.010 in. with close tolerances held.

finally selected permits taking metal from 8 in. slab size down to 0.0005 in.

In deciding on a hot mill, space limitations and the high degree of versatility required ruled out most common designs. A 24-in. four-high reversing coiler furnace mill was purchased from E. W. Bliss Co. Essentially, this is a single four-high reversing hot mill stand with a set of pinch rolls and a furnace-mounted hot coiling mandrel on each side. The entry side is serviced by two slab heating furnaces and a 40-ft long, roller hearth, gas-fired tunnel type reheat furnace. On the delivery side are a vertical edger, an upcut shear and a three-roll upcoiler.

Hot mill operation

In operation, an alloy slab is heated in one of the two-slab furnaces. It is then charged onto the mill entry table and passed through the tunnel furnace into the mill. A number of reversing passes reduce it in thickness until it is about 40 ft long. The slab is then moved into the roller hearth furnace and heated to rolling temperature.

When the reheated slab has made several additional passes through the mill on the tables, one

end is directed onto a coiler mandrel mounted in one of the hot coiler furnaces. The material then passes back and forth through the mill from one hot mandrel to the other, until it reaches a suitable hot rolled gage.

Finished, it will be directed out of the right hand coiler furnace through the mill, and along the delivery table and shear to the upcoiler.

When necessary, the mill can be used for straight slabbing operations or can be converted to roll some special shapes. Mill and auxiliary equipment were designed to roll slabs up to 8 in. thick and 22 in. wide, weighing as much as 3000 lb, to coiled hot-finished strip as thin as 0.050 in. Design features include extra post area for rigidity, a two-speed screwdown for rapid or accurate adjustment, high pressure descaling sprays and Mergoil pressure lubricated bearings on backup rolls.

High alloy sheet planned

One of the first jobs contemplated for the hot mill will be the development of procedures for producing high alloy sheet and strip. Sheet-formed turbine blading would be one application for the material.

The cold-rolling mill, a 24-in. four-high reversing design, also by Bliss, is of similar sturdy design. Capable of rolling through the range of 0.200 to 0.010 in. with better than commercial tolerances, it is equipped with a Pratt & Whitney strip gage and uses Mergoil pressure lubricated bearings on backup rolls.

It is anticipated that the hot mill will probably operate no more than perhaps eight days per month and the cold mill the balance of the time. Since there will be no necessity for running both together, the motor generators and accessory equipment which power the 2000-hp

hot mill will also run the 1000-hp cold mill.

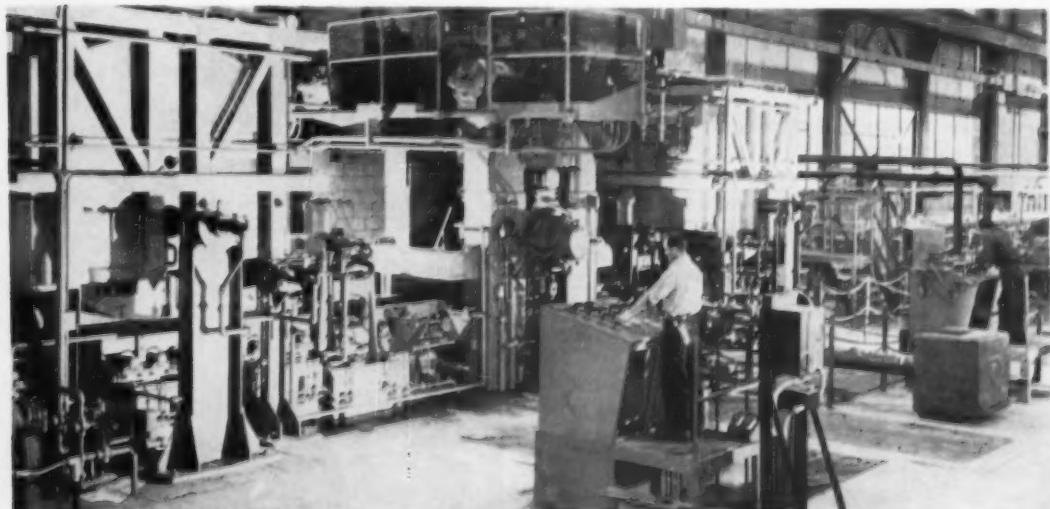
Rounding out the rolling facilities are a 7½-in. Steckel mill and a 6-in. Sendzimir mill. These will take care of the precision work. Major accessory equipment located next to the cold rolling section include a 24-in. Mattison #464 strip grinder for surface conditioning of coiled strip and a 25-hp coiling reel, which combines power with sensitive control.

Slitting and edge-trimming operations are carried out on three separate slitting lines. Largest is a heavy-duty 24-in. Yoder slitting line with a three-roll breaker mounted in the line ahead of the slitter stand. This unit is primarily for edge trimming and slitting of heavy-gage hot-rolled coils prior to cold rolling. It can, however, handle thinner gages, and is being equipped with an assortment of knives and spacers for all regular slitting operations.

Burr-free narrow widths of thin gage materials for toroidal core applications are provided by an 18-in. Herr precision slitter. This will be limited to use on material from 0.010 in to 0.001 in. Routine slitting on material narrower than 14 in. and up to 0.030 in. thick can also be done on a Waterbury-Farrel Model O slitter.

Shearing of sheet lengths from rolled coils is accomplished on a shearing line incorporating an 11-roll Waterbury-Farrel leveler with an automatically controlled, fast acting shear, a carpeted hump table, and roller-driven sheet delivery table. This unit automatically feeds, levels and shears highly polished material with a minimum of scratching.

In addition to the above, the plant is equipped for handling all phases of metal conditioning and cutting, and has laboratories and quality control facilities, as well as all necessary utilities for its economical operation.



FOUR-HIGH reversing coiler furnace mill can roll 8 in. slabs to 0.090 in. thickness. An integral roller

hearth furnace reheats and holds the material at correct temperature.

With tractor drive parts—

Induction Heating Speeds Case Hardening

- Local hardening to a case depth of 0.030 in. is effectively controlled by an induction heating setup . . . Temperature of 1600°F is attained in seconds.
- Workpieces are dropped directly into an oil spray quench . . . Scanning spray mechanism case hardens long workpieces evenly.

• INDUCTION HEATING is used at the Milwaukee Works of International Harvester Company for localized hardening of gear teeth and other components. The cycle sometimes includes furnace heating also.

Large bull gears employed on tractor final drives are among those in which teeth are hardened. Before tooth hardening is undertaken, gears are preheated to 700°F in a vertical Lindberg furnace. This preheating requires 1½ hr and is employed to produce desirable residual stress in the roots of the teeth which increases their strength. SAE 1050 steel is used in these gears.

Temperature retained

As gears emerge from the preheat furnace, an electric trolley hoist picks them up one by one and shifts them to a 150-kva Tocco induction heater. Here, the gear is loaded onto a carrier and is lowered by a rack into the induction coil. The transfer is accomplished without significant temperature drop.

When the gear is inside, the coil is energized. The gear is rotated slowly in the coil field. Teeth attain a temperature of 1600°F in 32 seconds.

The coil is de-energized. Five seconds later the rotating gear carrier is lowered into an oil spray quench held at 100°F. Oil is pumped through jets at 60 psi to impinge at high velocity on the tooth surfaces of the spinning gear.

A case depth from 0.030 to 0.035 in. results. Roots of the gear teeth are hardened to about 50 Rc. If water were used for quenching,

By G. B. KINER,
Works Metallurgist,
Milwaukee Works,
International Harvester Co.

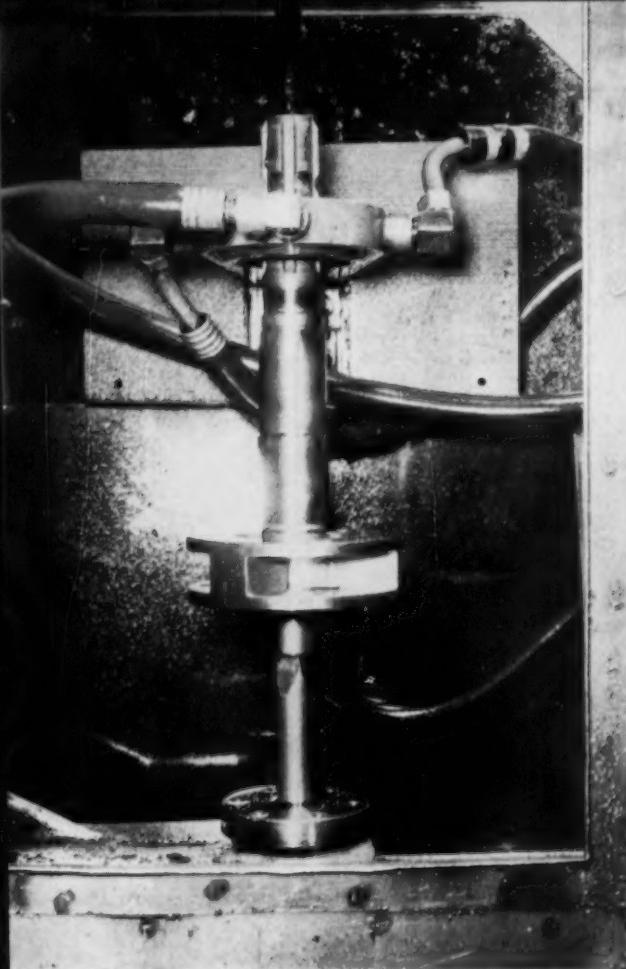
cracking at the roots of the teeth might occur.

After quenching, the gear is shifted by trolley hoist to the adjacent draw furnace. There it is tempered at 375°F for 1½ hr.

As the drawn gear emerges at 375°F, it is shrunk fit onto a mating hub flange. Shrinkage causes the gear diam to contract about 0.008-



BULL GEAR teeth are heated to 1600°F in 32 seconds, then quenched in an oil spray bath.



PLANET CARRIER splined end is hardened to RC 60 by this scanning oil spray quench setup.

in. as cooling to room temperature takes place.

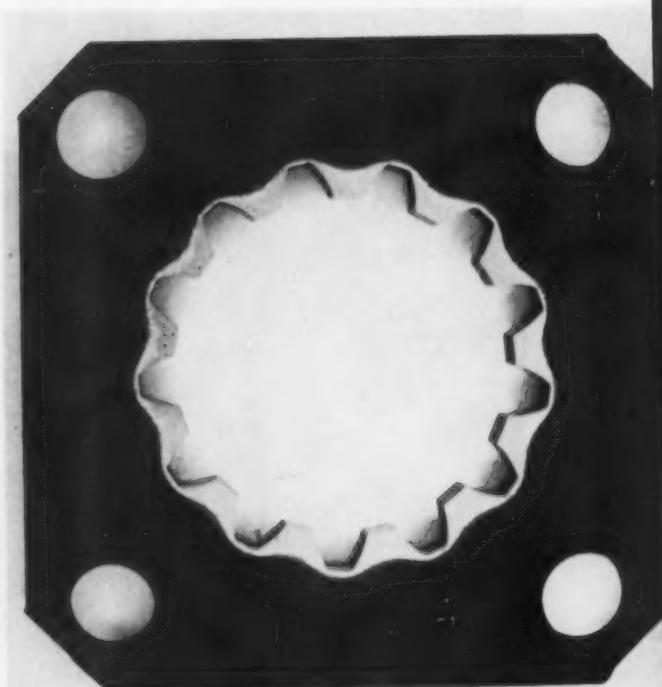
When the flange is in place and the assembly has cooled, it is transferred to a press. Resistance-heated rivets are applied and headed. These complete the fastening of the flange to the gear.

A square clutch coupling plate undergoes similar local hardening. Heat-treating produces local hardness in and around internal gear teeth of the plate.

Quench temperature reached quickly

SAE 1050 steel is used in this plate. A hardness of RC 55 is produced at the teeth. Heating is done by a 175-kva induction setup using current at 9600 kilocycles. It requires 10½ seconds heating time to attain the 1600°F quench temperature. In this case, the coil heats with a scanning action. A five second delay precedes the oil quench.

The quench ring cools with a scanning motion. To provide the rapid quenching necessary to yield the specified hardness, the oil jets impinge upon the heated surfaces at high velocity, under a pressure of 80 psi.

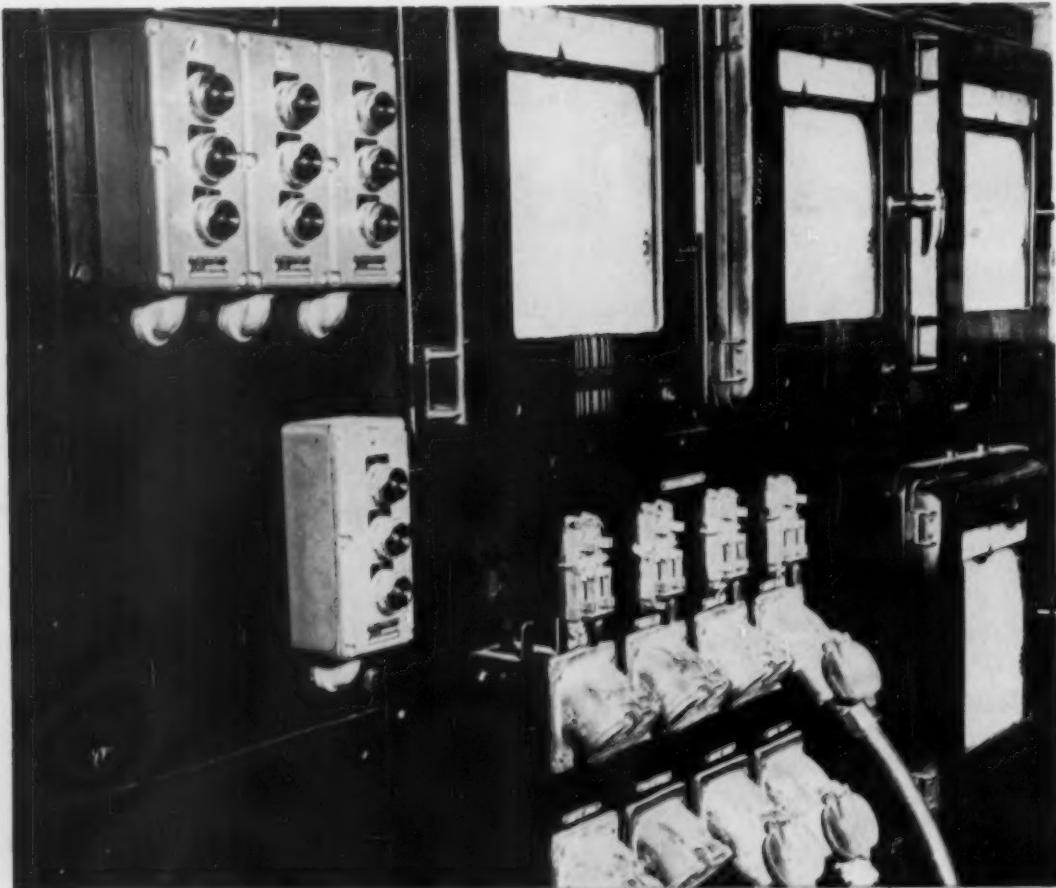


ETCHING demonstrates hardness pattern produced in internal teeth of clutch coupling plate.

Planet carriers are hardened in the same machine employed for heat treating the clutch plate. In this case, the SAE 1050 steel used must be hardened to RC 60 on the surfaces heated. These include the whole length of the spline at the top end, and an adjacent surface on which needle bearings roll. A scanning motion is used both through the coil and the quench ring. The work piece rotates on vertical centers.

Subsequently, the coil is changed and a second cycle is run to harden the pilot at the end of the shaft. The work remains fixed and the coil is energized for only 3.10 seconds. This is sufficient time for the pilot surface to attain a temperature of 1600°F. Quenching is carried on with oil spray at 100°F and 30 psi. Spray hits the pilot surface ½-second before the current is shut off in this case. Hence, there is no temperature drop prior to the instant that oil strikes the surface to be quenched.

After hardening, both the clutch plate and the planet carrier are passed through a draw furnace at 325°F completing the heat-treating cycle.



TEMPERATURES of eight annealing furnaces are charted by these recording controllers. Restorer

stations at left permit supervision of thermocouple circuits for each instrument.

Device Improves Thermocouple Pyrometer Operation

◆ The best pyrometric instruments for temperature detection and control are no better than their sensing elements . . . Loose, corroded, oily or dirty thermocouple circuit connections are common causes of inaccurate pyrometer readings—and poor temperature control.

◆ Here's how Sharon Steel Corp. was able to improve annealing practice, with an equipment for detecting and temporarily repairing thermocouple circuit faults.

By D. H. JONES, General Foreman,
Annealing Dept., Roemer Works,
Sharon Steel Corp., Sharon, Pa.

◆ MORE ACCURATELY CONTROLLED heats and better overall heat-treating efficiency are being achieved in Sharon Steel Corp.'s Annealing Department, through application of a device which detects and restores faulty thermocouple circuits during heat-treating operations.

Sharon Steel installed the first unit about a year ago. Purpose of the Restorer made by Peerless Electric Co., Warren, O., is not to check the standard pyrometric instruments recording and controlling furnace temperatures, but to supervise correct thermocouple circuit performance. When such common faults as poor, dirty or corroded thermocouple circuit connections affect electrical conductivity, the

excessive measuring circuit resistance causes incorrect pyrometer readings. . . . and poor temperature control.

Thermocouple failure was formerly looked on as a normal occurrence. Thermocouples served their purpose for a short time, then became defective. Since thermocouple cost is low, frequent replacement was little more than an annoyance. Far more important, however, was the fact that furnaces annealing valuable material depend on correct couple performance.

As an initial trial, one Restorer unit was installed on instrument group 19, consisting of five Leeds and Northrup pyrometers recording heats in five furnaces with three couples each. Soon after its installation, the unit began showing results. By pushing a button on the instrument board, furnace operators were able to temporarily repair many thermocouple circuit faults when they occurred — during the heat. On periodic tests, the red continuity signal of the Restorer assured control men that the instruments were receiving the proper millivoltage from couples to control heat temperature accurately.

Furnace operators use the Restorer frequently. The continuing check on heats eliminates guess-work and permits quick correction when a couple is suspected of being faulty.

Applies test charge

The Restorer is simple in its operation. When the furnace operator pushes a button on the instrument panel, the unit applies a test charge of about 400 v. across the corresponding thermocouple circuit. This charge breaks down any high resistance in the circuit caused by dirty or corroded connections. It also refuses some cracked or broken thermocouple tips. Pushing the button disconnects the pyrometer to prevent damage to its sensitive circuits.

When he releases the button a few seconds later, the test voltage is removed and the pyrometer is reconnected to the circuit. The pyrometer now receives the full thermoelectric voltage generated by the furnace heat. If the instrument is operating properly, the trace recorded for this couple is accurate.

An important by-product of the Restorer at Sharon Steel is reduced thermocouple circuit maintenance. The unit saves delays previously caused by checking and re-checking instruments for accuracy. Instrument men now test couples and circuits with the Restorer before testing pyrometers. Since thermocouple failure is a major cause of pyrometry error, this practice saves much valuable time.

The device has also led to a new standard for replacing thermocouples. Repair of a minor couple fault often lasts for the remainder of a heat and longer, making immediate replacement of the couple unnecessary. Routine use of the Restorer keeps close check on the cou-

ple's operation in later heats. When the couple repeatedly fails during a heat it is replaced after the load cools.

Restorer units now monitor all thermocouples in our 23 annealing furnaces, including new radiant tube furnaces. Proper couple operation is especially necessary in these new furnaces because the controlling couple cannot be reached for repair during the heat. The Restorer insures that this couple is providing the pyrometer with the proper signal voltage to accurately control the heat and produce specified steel properties.

COILS OF COLD-ROLLED steel are heat-treated in these seven furnaces. Control instruments operate from catwalk, right.

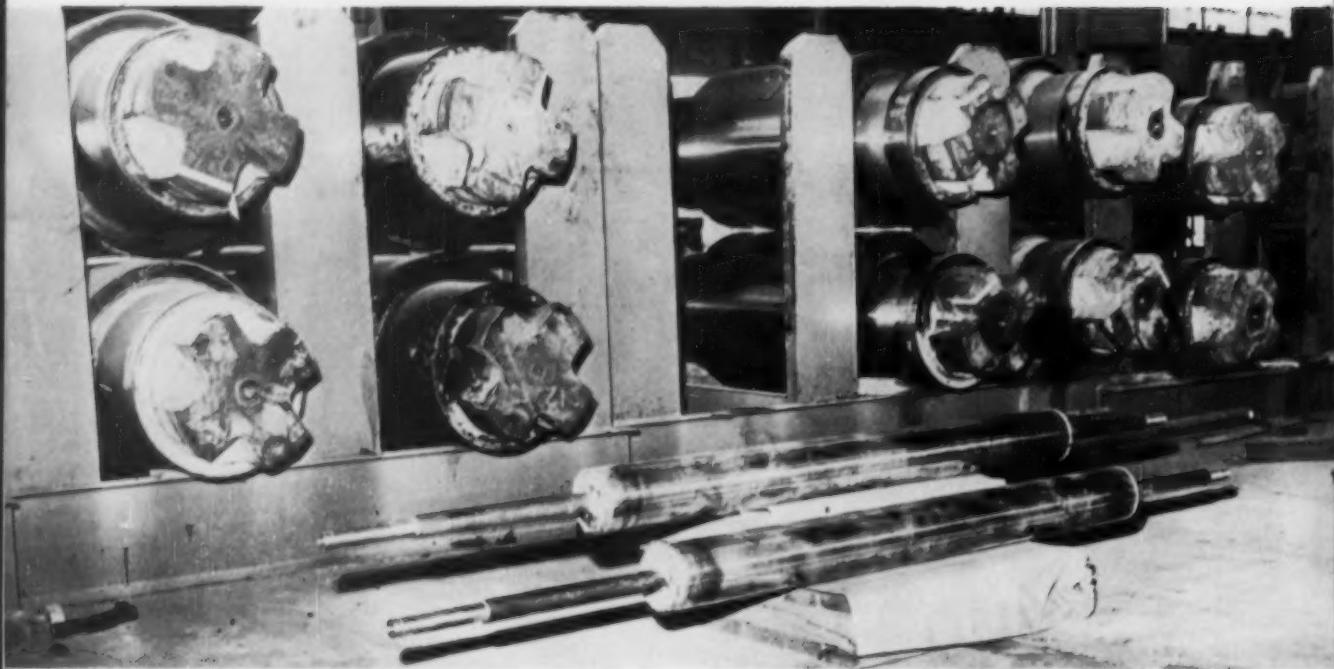


READY FOR HEAT-TREATING, this load of coils has control thermocouple set nearest the top, where furnace heat will be greatest.



In mill operations—

Ceramic Insulation Reduces Roll Maintenance



ROLL SLEEVES (foreground), packed with long life ceramic fiber insulation, hold high alloy sheets at

rolling temperature from furnace to two-high mill. Sleeves spin up to 300 rpm.

• CERAMIC fiber insulation is extending the operating life of heating furnace roll sleeves to 1100 hours between repackings, almost twice as long as that previously possible. The water-cooled rolls work in the discharge section of a furnace at 2000 to 2150°F.

Insulation is packed along the 78-in. roll sleeves, between the sleeve and the 2½-in. OD sleeve shaft. The sleeve is 7-in. OD and is fabricated from 3/16-in. Hastelloy alloy X sheet.

Operation severe on insulation

Heated high alloy sheet normally passes over the roll sleeves at a relatively constant rate, turning the sleeves at 15 rpm. But when the sheets must be heated longer in the furnace, the rolls are stopped entirely. Further, the roll sleeves are repeatedly speeded to 300 rpm to move heated sheets to a two-high mill faster.

These severe operating conditions rapidly reduced the previously used insulation to pow-

der. Such powder easily leaks from the roll sleeves, and blows on the heated sheets, causing imperfections. With little or no insulation, the water-cooled rolls quickly lower the temperature of the heated sheet.

Engineers at the Wrought Alloy Plant of Haynes Stellite Co. selected an aluminum oxide and silica insulating fiber to reduce sheet imperfections and boost repacking time above the 600-hr figure then necessary. The fiber has a low thermal conductivity and holds its properties up to 2300°F, more than 150°F higher than the maximum operating temperature of the furnace.

The Fiberfax material, manufactured by The Carborundum Co., has thousands of intertwining fibers. This interlocking mesh tends to stay firmly in place despite the stopping and starting actions and the changing speeds of the roll sleeves.

After 3800 service hours above 2000°F, rolls showed only minor erosion and deformation.

(ACTUAL UNRETOUCHED PHOTO)

Here's why NIRONITE "F" work rolls outproduce other types in hot mills

Take a look at the close grain structure and deep shell of this test-fractured 21" diameter Mack-Hemp Nironite "F" work roll. You can actually see why Nironite "F" rolls give you greater tonnages between regrinds . . . why they offer greater resistance to banding...why they last all the way to worn-out diameter. So distinctive is this close grain structure that mill

operators report that they can recognize Nironite "F" rolls by the continued good roll surface even after long use—whether or not they have seen the stripes on the wabblers.

Nironite "F" rolls are high-nickel, high-chromium alloy grain type, double poured for maximum strength. They can be supplied in any desired hardness from 65 to 85 Shore sclero-

scope (C Scale).

Mack-Hemp offers an entire series of Nironite nickel-chromium cast iron alloys for 2-high or 4-high hot mill roughing, intermediate and finishing rolls. Your Mack-Hemp sales engineer will be glad to give you assistance in choosing exactly the right type and hardness for your particular rolling problem.

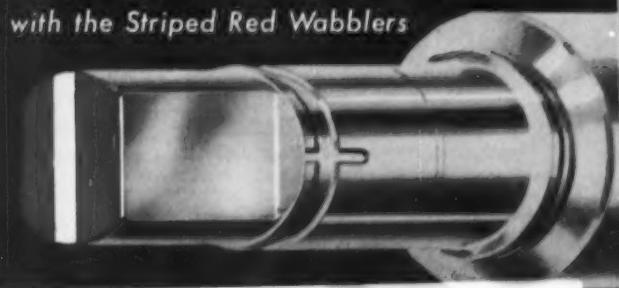
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DIVISION OF

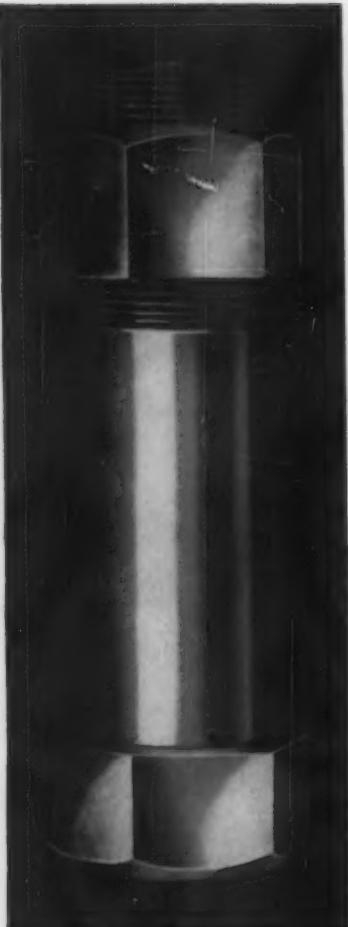
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New Technical Literature:

Catalogs and Bulletins

Gas analyzers

A new brochure—Bulletin 108A—is available which describes an oxygen analyzer (the F3) in detail. It shows how the F3 makes its measurement directly upon the oxygen content of the gas based upon the paramagnetic properties of oxygen itself. The operating principle is clearly illustrated, typical applications in a wide range of industries are highlighted, and helpful technical data (operating ranges, response rates, sampling equipment, etc.) is also given. *Arnold O. Beckman, Inc.*

For free copy circle No. 1 on postcard, p. 117

Rust inhibitor

A one-coat rust inhibitor aluminum paint, Permite Rust-Blok, is discussed in a new bulletin. An explanation is given of what the product is and does, while its properties are detailed. Typical uses and application advice are also included. *Permit Aluminum Industries, Inc.*

For free copy circle No. 2 on postcard, p. 117

Weld tooling

A 28-page catalog of production weld tooling contains application photographs of equipment used in steel fabricating industries—welding positioners, turning rolls, seamers and special production welding fixtures. *Pandjiris Weldment Co.*

For free copy circle No. 3 on postcard, p. 117

Cutting

A brochure describes, pictures and gives specifications for a German-made thread-cutter, abrasive wheel cutting-off machine, circular sawing machine, hand shears, roller plate-shears, sheet metal shears, and filing machine. *Wandsbeker Werkzeug-Gesellschaft.*

For free copy circle No. 4 on postcard, p. 117

FOR YOUR COPY

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 117.

Alloys

"Alloy Steels," is the title of a 32-page brochure discussing the advantages of alloy steels. In the brochure sections are devoted to chemical testing and control, heat treating, analysis, and testing. Tables on the properties of various steels are given at the back of the publication. *Sheffield Steel Div., Armco Steel Corp.*

For free copy circle No. 5 on postcard, p. 117

Packaging

A new 12-page brochure featuring some hard-to-pack wirebound box designs developed for nationally known manufacturers has been announced. It gives detailed descriptions of how revolving steel doors and hi-voltage disconnect switches are packed. Featured in the brochure are wirebound packaging competition winners. *General Box Co.*

For free copy circle No. 6 on postcard, p. 117

Conductors

Information on aluminum triplex service drops is included in a new booklet. The 20-page illustrated publication discusses the various types and sizes of triplex available, tabulates cost comparisons, cites advantages and discusses methods of dead-ending and connector selection. In a separate section specific questions on cost, efficiency and related information are answered. *Kaiser Aluminum & Chemical Corp.*

For free copy circle No. 7 on postcard, p. 117

FREE TECHNICAL LITERATURE

Industrial trucks

A new catalog sheet illustrating and describing a complete line of power industrial trucks is now available. Detailed are the company's fork trucks with capacities from 2000 to 10,000 lb; light and heavy-duty ram trucks with capacities from 2,000 to 80,000 lb; low lift platform trucks with capacities from 4,000 to 80,000 lb; high lift platform trucks with capacities from 4,000 to 16,000 lb; crane trucks with capacities from 3,000 to 10,000 lb; and die handling trucks with capacities up to 80,000 lb. The literature also illustrates and describes a complete line of industrial truck attachments such as clamps, rotating heads, booms and hooks, adjustable forks, load backstops and others. *The Elwell-Parker Electric Co.*

For free copy circle No. 12 on postcard, p. 117

Pipe fittings

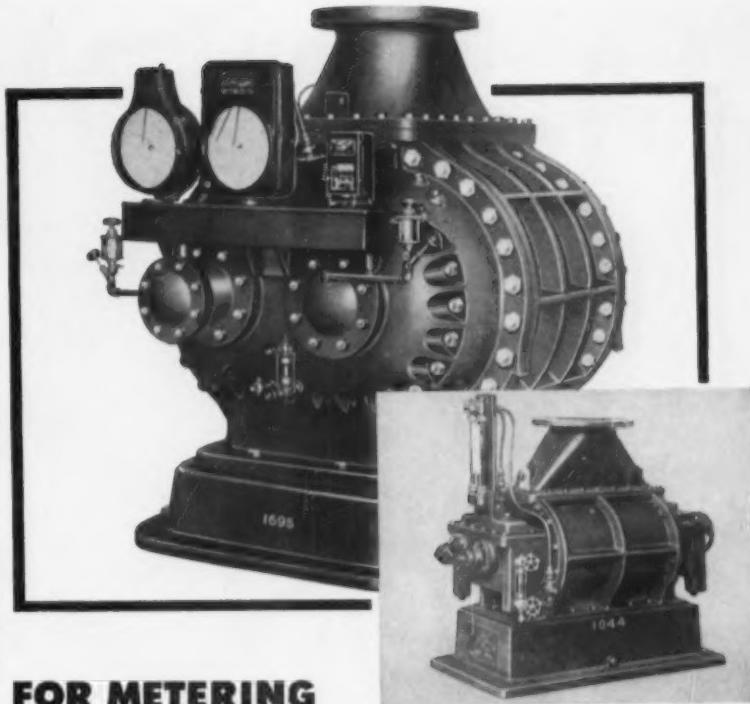
Unplasticized polyvinyl chloride (PVC) pipe fittings and flanges are the subject of a new booklet. It discusses industrial applications of PVC piping and gives complete specifications for threaded and socket types of PVC fittings, and PVC flanges, in both normal and high impact grades. The booklet also lists the many major industries that are using PVC piping on a rapidly increasing scale and includes installation information, pressure-temperature charts, chemical resistance tables and other helpful reference data. *Tube Turns Plastics, Inc.*

For free copy circle No. 13 on postcard, p. 117

Controls

Catalog 65 covering a new, improved line of Micro Switch trip controls—electric two-hand clutch controls for industrial machines—has just been published. The equipment shown includes control boxes, hand switches, foot switch, limit switches and lock-out switch; another section covers clutch actuating equipment, including electric solenoids, air cylinders, air valves and air-lube unit, making possible the ordering of complete packaged installations. *Micro Switch Div., Minneapolis - Honeywell Regulator Co.*

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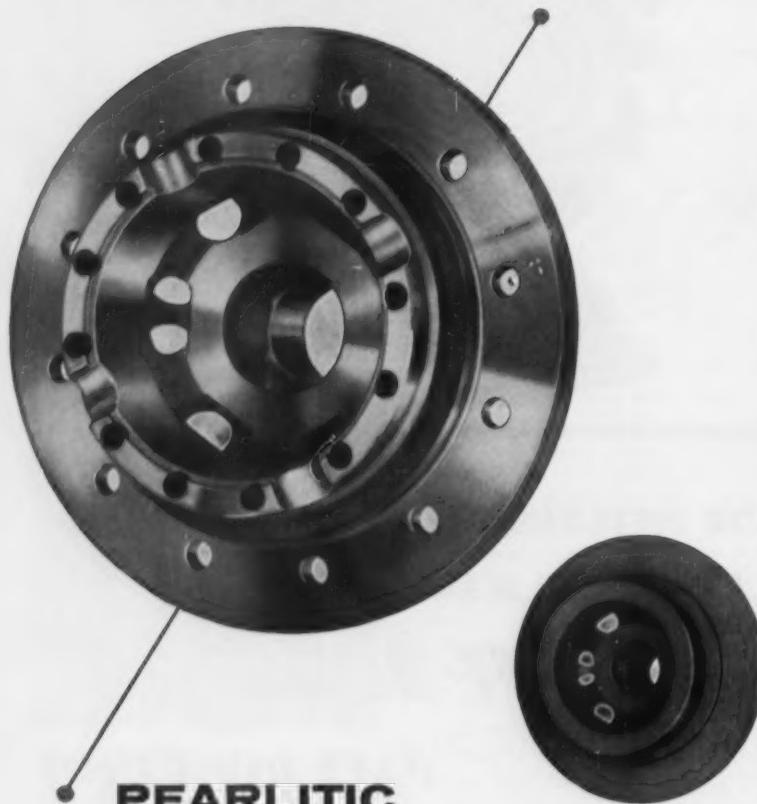
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The Nation's largest independent producer of malleable and pearlitic malleable

Hand pump

A portable hand pump for refilling all types of oil cups and reservoirs quickly and conveniently, directly from a gallon or larger container through a light flexible hose is described in Bulletin 44. The unit is also used for dispensing oil to bearings, cutting tools, conveyor and drive chains, gears, pipe threading operations and spindle bearings on textile machinery. *Trico Fuse Mfg. Co.*

For free copy circle No. 8 on postcard, p. 117

Rotary table

A 24-in. plain optical rotary table is described in a new folder. The unit is reported to provide direct settings to 1 sec of arc; easy-to-read system, plus reversible power rotation; and full 360° adjustment of optical zero point. Specifications are included. *Pratt & Whitney, Div. of Niles-Bement-Pond Co.* For free copy circle No. 9 on postcard, p. 117

Stresses in bars

"Residual Stresses in Cold-Finished Steel Bars and their Effect on Manufactured Parts," is the title of a newly published, 32-page, pocket-size booklet. Specific subjects covered include residual stresses in cold drawn bars, turned bars, ground bars, heat treated steel as well as discussions of fatigue, cracking, machinability, tolerances and corrosion. More than fifteen different pictures and curves are used to illustrate the booklet. *La Salle Steel Co.*

For free copy circle No. 10 on postcard, p. 117

Alloys

Information on nickel silver and phosphor bronze alloys supplied in sheet, strip and coil is contained in a 60-page general catalog. It also covers several special alloys produced by the company. Specifications are given for 8 nickel silver and 3 phosphor bronze alloys, as well as on 3 special copper base alloys. The booklet includes tolerance tables for thickness, width and straightness of refractory alloys. *For copy write on company letterhead to Waterbury Rolling Mills, Inc., Waterbury, Conn.*

For free copy circle No. 11 on postcard, p. 117

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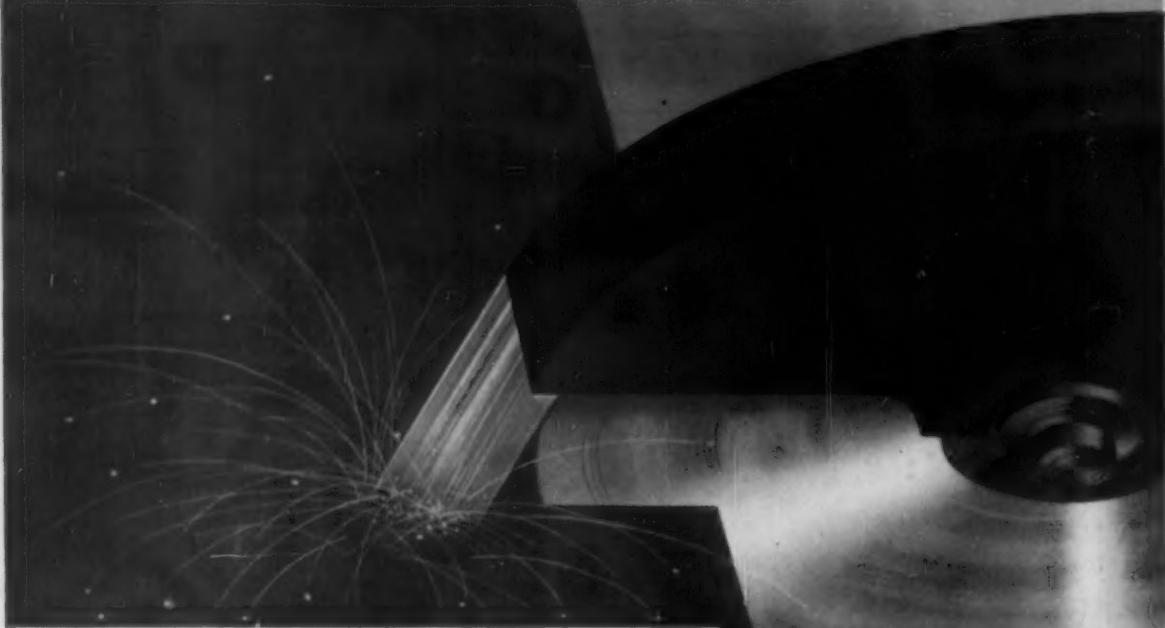
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Steel warehouses everywhere are having difficulty maintaining a well rounded stock. However, many steel buyers have found that the very item they have not been able to get elsewhere is in the Levinson warehouse! If the steel you need is not available Levinson may be able to pick up the item for you or offer a suitable substitute.

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This section starts on p. 112

Magnetic conveyors

Magnetic conveyors are described in the new illustrated 8-page Bulletin MC-250. The conveyors offer new possibilities for completely automatic handling of ferrous parts and pieces. They are said to convey ferrous parts and pieces up inclines as steep as 90° without need for belt cleats. Conveyors automatically feed machines, stack parts and perform parts turn-over and other handling operations. The bulletin contains details on design features, operating advantages and application possibilities for both custom and standard series magnetic conveyors. *The Homer Mfg. Co.*

For free copy circle No. 15 on postcard

Mill bearings

Literature is available describing a full range of English mill bearings including ball, roller and thrust types, interchangeable with American designs. Solid, flexible and maxload bearings are described for 10 mm to 350 mm shaft diam. For catalogs write Pollard Bearings, Ltd., Knottingley, Yorkshire, England.

For free copy circle No. 16 on postcard

Strapping

Steel strapping equipment suitable for tying for shipment products weighing up to 100 lb is described in a new brochure. The equipment is recommended for reinforcement, closure and unitizing of corrugated and fibre containers, wooden boxes and crates, box shooks, shingles, dimension stock and produce crates up to 100 lb. *Gerrard Steel Strapping Div., United States Steel Corp.*

For free copy circle No. 17 on postcard

Hose couplings

A revised catalog on a quick seal line of connect-disconnect hose couplings has just been released. This new, 20-page catalog features page-size cut-away views of the coupling which reveal its design and construction. These illustrations reveal how this construction provides: a unique sealing action and a full swiveling action. Also described in this catalog are single-check valve and double-check valve modifications of the coupling which seal off one or both ends of a fluid line the instant coupling is disconnected. Tables and diagrams are included in the catalog which indicate available coupling sizes and types of hose connection, and provide instructions for selecting the right type and size for a particular application. In addition there are tables for selection of seals for different coupling sizes, and a table giving the safe operating pressure for each coupling size. *Titeflex, Inc.*

For free copy circle No. 18 on postcard

Wrought aluminum

The complete range of a company line of wrought aluminum mill products is presented in a new 8-page brochure. Illustrations and text describe extruded shapes, structurals, machining stock, drawn tube, forging stock, press forgings, impact extrusions, screw machine products, and heavy press extrusions. Included are tables pertaining to standard manufacturing limits for extrusions, standard tolerances, and properties and typical uses for various aluminum alloys. *Harvey Aluminum.*

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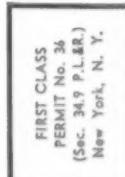
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Clutches

Information is available on a line of clutches specifically for heavy duty. Clutch plates used in these new clutches are recommended for heavy duty machines such as tractors, trucks, cranes, shovels, bulldozers, tanks, earth movers, graders, and other heavy machines. Rockford engineers field tests are reported to show that the clutches provide up to 100 pct more torque capacity and permit the use of smaller diameter, less expensive clutches. Another important advantage claimed is less lever or pedal pressure required for engaging and disengaging. *Rockford Clutch Division, Borg - Warner Corp.*

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Friction material

A new folder describes a line of friction materials and molded damper parts for the automotive, industrial equipment and home appliance manufacturers. Featured with illustrations in the 2-color, 4-page folder (Catalog No. 648) are heavy duty friction segments especially designed to provide fade-proof braking power for cranes, power shovels, drilling rigs, hoists and other types of industrial equipment. Also highlighted are molded vibration parts including leaf spring interliners, spring buttons, ring and disc clutch facings, and various types of snubbers and dampers, with a separate section on transmission linings, thrust washers and clutch facings. *World Bestos Div., The Firestone Tire and Rubber Co.*

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Adhesives

Adhesives for electrical and electronics manufacturers are described in a 4-page bulletin. Properties and application sequence are given for these adhesives which are recommended for thin metal laminates, rubber, wood, ceramics, thermo-setting plastics and fibrous materials. *Cycleweld Products Div., Chrysler Corp.*

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Tubing

An 8-page folder contains a complete listing of the types of tubing produced by a company and a brief description of various kinds of technical literature available on such specific types of tubular products as stainless and alloy tubing, stainless pipe, stainless sanitary tubing, heat exchanger and condenser tubing, boiler tubing, and mechanical tubing. In addition, it contains a table of chemical analyses, physical properties, mechanical properties, and creep strength of 20 steels ranging from carbon steel through the stainless steels, which are used by the processing industries. *Babcock & Wilcox Co.*

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Thickeners

A new, 16-page catalog (Bulletin No. 31-E) describes a line of thickeners, clarifiers and agitators for mining, chemical, metallurgical and other industrial processing operations in which separation of solids from a liquid is required. The catalog discusses applications and shows construction details for "Auto-Raise" thickeners, circular and rectangular type clarifiers, agitators, and related equipment. A formula is provided for determining tank diameters of thickeners for any given set of data. *Hardinge Co., Inc.*

For free copy circle No. 22 on postcard

Plating

The use of metal fluoroborate solutions in plating operations is covered in a new booklet. Individual information is given for copper, lead and lead-tin alloy, nickel, iron, tin and cadmium plating solutions. *Baker & Adamson, Allied Chemical & Dye Corp.*

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Rust controller

A descriptive folder, Publication No. PC-322, discusses a new grinding compound, Cimplus—a water-soluble, transparent concentrate that gives rust control at dilutions between 1 to 100 and 1 to 200. Used primarily as a transparent grinding fluid, the compound can also be used when machining cast iron. Additionally it has application as a water conditioner to increase rust control in the manufacturer's Cimcool mix. *Cincinnati Milling Machine Co.*

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"No breakdown in 14 years with Morse Roller Chain"

—says Ajax Electric Company engineer



Furnace interior, from end. Main drives lie parallel along bed. Transfer chain drives convey fixture carriers.

← Operator hangs parts on fixture holder. By changing sprocket or adding or removing links, timing of drives can be altered.

"We've worked with Morse Chains for 14 years, and have never experienced a breakdown of this product during that period. And, in our complex installations of electric salt bath furnaces, Morse is giving us excellent results."

Philip A. Atwood
Field Engineer
Ajax Electric Co.



Check these advantages of Morse equipment:

- ✓ Long service life
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- ✓ Precision construction

Literature, engineering help FREE

Write today for Catalog C 51-50, or free consultation. Morse has skilled engineers available to help you solve practically any problem involving transmission equipment: Roller Chain, Hy-Vo Chain, Silent Chain, Sprockets, Clutches, and Couplings.

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MORSE



CHAINS, CLUTCHES,
AND COUPLINGS

Ajax Electric Salt Bath Furnaces point up how roller chain can save operating costs, cut your downtime, give you flexible, dependable power.

Ajax Electric Co., Philadelphia, makes electric salt bath furnaces, used to temper metals. These furnaces use roller chain throughout for conveying and power transmission.

Alkali cleaner, molten salt, steam—each is a potential threat to the more than 2000 feet of chain used. Yet, for 14 years, drives like these have performed efficiently, *without a single breakdown*. (Read statement below.)

Morse Roller Chain instantly adaptable

The metal parts hardened in these Ajax Furnaces often require "dip" periods that vary in length. By changing the number of links in a drive, or sprocket diameter, each step can be speeded up or slowed.

You, too, can get superior power transmission with Morse Roller Chain. Precision-made in all standard sizes and pitches. A wide variety of standard and special-purpose attachments are available.



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 fast deliveries, prompt service and top quality!

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Headquarters for RIVETS
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and Rivet-setting Machines

DRILLS 7% MORE GRAY IRON
VALVE BODIES PER SHIFT



...thanks to

FERROCARBO®

Users everywhere report similar experiences. In fact, on 67 machining tests in 11 large machine shops, castings of gray iron treated with FERROCARBO averaged 89.5% greater machinability per tool than untreated castings. These premium castings are finer-grained, denser, stronger, yet they COST YOU NO MORE... because your foundryman, using FERROCARBO, makes worthwhile savings in raw material costs.

FOR FREE BOOKLET on FERROCARBO, citing actual case histories of faster machining, with longer tool life, write The Carborundum Company, Dept. 41, Niagara Falls, N.Y.

CARBORUNDUM®

TECHNICAL BRIEFS

HANDLING: Trays Aid Assembly

Vulcanized fibre materials handling receptacles permit compact, safe movement of parts . . . Lower cost of transport . . . The tapered shape aids in stacking.

Vulcanized fibre nesting-stacking trays for fast, efficient handling of television set components are helping GE's Electronics Div., Syracuse, N. Y., improve assembly operations, decrease materials handling costs and obtain greater work space.

The company was looking for an intra-plant materials handling system to further lower their unit costs. After experimenting unsuccessfully with wooden trucks on roller wheels and corrugated, partitioned cartons, they chose Kennett materials handling receptacles. These are manufactured by National Vulcanized Fibre Co., Wilmington, Del.

In using the trays, which are fitted with interior wooden partitions built in GE's own wood-working shop, the company places television components in individualized compartments of the trays, then stacks them in pallet loads.

The tapered shape of the receptacles, together with the protective metal bar which can be fitted across the top, permits compact stacking of the maximum number of full trays without damaging contents.

Trucked to Assembly

Loaded trays are then transported by fork truck to assembly stations where they are placed in tiers on the floor beside the assembler. Thus the assembler removes sub-assemblies and parts from the full trays at his left, performs the required assembly operation, then places the completed components in empty trays on his right.

As trays on the right are filled, they are moved by fork truck to the next assembly station where the process is repeated. This continues until the television com-

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 117. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

ponents in the vulcanized fibre containers arrive at the final assembly area.



Sub-assemblies are transported easily, safely in fibre trays.

Instruments:

Tiny transistors control strip thickness

Nine small transistors are being used to control the thickness of steel produced on a strip mill at U. S. Steel's Irvin Works, Pittsburgh.

The transistors, "brain" of an automatic gauge control system developed jointly by the U. S. Steel Corp. and the General Electric Co., actually control the speed and rolling pressure of a 5-stand mill capable of producing strip steel at the rate of 3800 fpm. The system controls the thickness of

TECHNICAL BRIEFS

the rapidly moving steel to maintain dimensional specifications required. In use, the transistors are similar to a radio tube.

The system utilizes G-E X-ray gauges in conjunction with electrical controls.

Suggested By Analyzer

It got its start in Schenectady when the basic industrial problem — how to automatically and successfully hold strip steel to close tolerances—was fed into an electronic differential analyzer. The analyzer digested the problem and supplied information which gave the engineers valuable assistance in the creation of the automatic thickness control system.

The system is virtually self-inspecting and automatically compensates for product and operational variations. Formerly, cold reduced product thickness was controlled manually on an instant-to-instant attention.

Corrosion:

Cast stainless alloys improve dye vessels

In the design of their package dyeing machine, engineers of Smith, Drum & Co., Philadelphia, Pa., chose their construction materials from a group of cast stainless alloys offering a wide range of corrosion resistant properties. These are the austenitic or 18-8 chromium-nickel types, noted for their strength, ductility and good fabricating qualities. Although all of the alloys in this group have adequate corrosion resistance in this type of service, the columbium-containing CF-8C type was specified for much of this equipment because of the welded construction employed.

Shapes Prevent Trapping

They are using cast-weld stainless components in their design of processing equipment to avoid contaminating entrapment of old solutions and corrosion of the equipment itself. Since dyeing of



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TECHNICAL BRIEFS

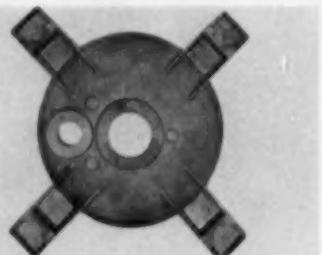
"Cast stainless alloys resist dye solutions."

the new synthetic textile fabrics must be precise and reproducible, it is especially important to maintain the purity of dye liquors.

By using cast stainless alloys resistant to dye process solutions at elevated temperatures and pressures, designers can incorporate components with streamlined shapes that prevent traps and aid in cleaning dyeing equipment.

Dye Kettle Assembled

Two of the most interesting cast high alloy parts are the dye kettle head and base. The one-piece base casting replaces a fabrication which had previously been made of a disk head to which flanged openings were attached—with the feet welded on as separate pieces.

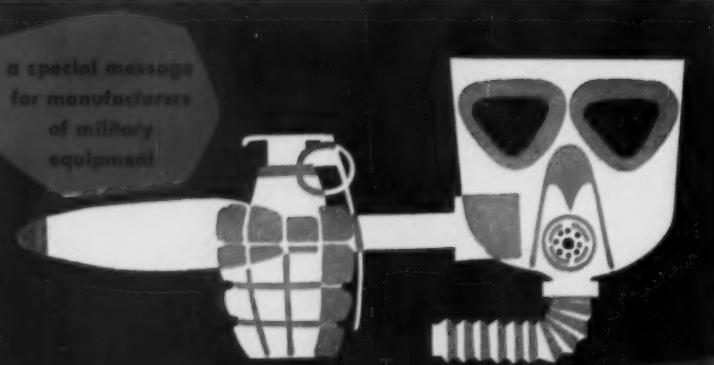


One-piece casting instead of three, cut dye kettle base cost.

In the present construction, the casting is welded to a rolled section, and a similar casting, without feet, forms the head. These three sections complete the dye kettle assembly, which meets boiler code standards.

Handle Hot Acid

Engineers at Smith, Drum & Co. make use of other cast high alloys, when severe corrosives are processed. One of the most corrosive solutions handled by cast stainless parts is hot dilute sulfuric acid at 200°F, having a concentration of about 20 lb of acid to 600 gal of water and a pH of 3. For resistance to this type of acid corrosion, as well as the corrosion from bleaching agents such as sodium peroxide, molybdenum-containing type CF-8M cast alloy normally is employed.



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ON ZINC AND CADMIUM you can get highly corrosion resistant finishes to meet any military or civilian specifications and ranging in appearance from olive drab through sparkling bright and dyed colors.

ON COPPER... Iridite brightens copper, keeps it tarnish-free; also lets you drastically cut the cost of copper-chrome plating by reducing the need for buffing.

ON ALUMINUM Iridite gives you a choice of natural aluminum, a golden yellow or dye colored finishes. No special racks. No high temperatures. No long immersion. Process in bulk.

ON MAGNESIUM Iridite provides a highly protective film in deepening shades of brown. No boiling, elaborate cleaning or long immersions.

AND IRIDITE IS EASY TO APPLY. Goes on at room temperature by dip, brush or spray. No electrolysis. No special equipment. No exhausts. No specially trained operators. Single dip for basic coatings. Double dip for dye colors. The protective Iridite coating is not a superimposed film, cannot flake, chip or peel.

WANT TO KNOW MORE? We'll gladly treat samples or send you complete data. Write direct or call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified telephone book.

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**Here are two good examples of our work
in high-nickel castings!**



These are in the Duraloy HT group calling for Ni 33.37 percent. We've gone as high as 68% nickel on some castings where extremely high temperatures and very severe corrosive conditions had to be resisted. The important factor concerning castings for exceptionally high temperatures is that they must retain their structural form under load.

Knowing just how much nickel to put in and how much chromium and other alloying elements depends to a large extent on experience . . . and it is experience that we can offer you for the castings you need. We've been producing static castings since 1922 and centrifugal castings since 1933, being among the pioneer founders in each class.

If you would care to have our metallurgist study your casting problem, we shall be glad to have you call upon us for the service.

Our New General Catalog is yours for the asking.

THE DURALOY COMPANY

OFFICE AND PLANT: Scottdale, Pa.

EASTERN OFFICE: 12 East 41st Street, New York 17, N.Y.

DETROIT OFFICE: 23906 Woodward Avenue, Pleasant Ridge, Mich.

CHICAGO OFFICE: 332 South Michigan Avenue



Atomic Energy:

X-ray spectrometer detects minute changes

An X-ray spectrometer so sensitive it can detect changes as small as a billionth of an inch in the distance between crystal facets has been designed by General Electric Co. engineers at the Atomic Energy Commission's Hanford plutonium plant.



Spectrometer aids search for lasting atomic furnace elements.

The spectrometer is used to measure submicroscopic damage suffered by solids exposed to chain reaction heat and radiation in an atomic pile. Object of these studies is to aid in finding new atomic furnace elements that will stand up longer.

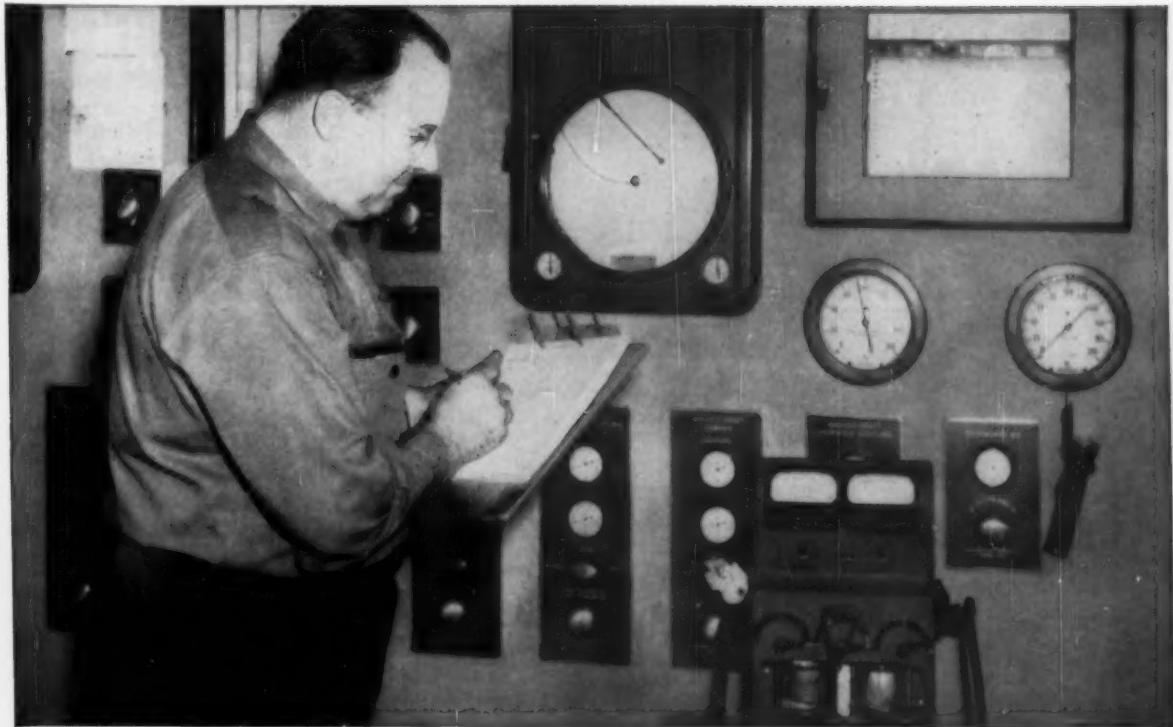
X-rays Show Deformation

A beam of X-rays is shot by the device at specimens of uranium and other materials which have been made highly radioactive in Hanford's plutonium - producing piles. A Geiger counter measures the strength of the reflected beam at various angles, with the angular distribution of these X-rays telling G-E metallurgists how much the specimen's molecular "building-blocks" have been deformed.

Handling:

Hydraulic operated equipment aids bundling coils or stacks.

Hydraulic steel strapping equipment developed by Acme Steel Co. facilitates handling of coil and stacks of sheet at the cold rolling



Calumet Division, Calumet and Hecla, Inc., Calumet, Michigan

"Cities Service Heat Prover Played A Major Role In Our Expansion Program"

Miners and refiners of copper, the Calumet, Michigan Division of Calumet and Hecla, Inc., relies on two power plants to operate its many mines, reclamation plants, mills, manufacturing facilities and mine rehabilitation projects.

The two plants, located at Lake Linden and Hubbell, were recently brought up to date. The Lake Linden plant now has modern steam generating equipment fired with pulverized coal. The Ahmeek plant was equipped with new coal distributors for its underfeed stokers and new plastic monolithic furnace settings.

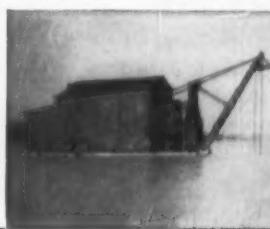
This modernization program, along with a planned preventive maintenance program which is now being put into effect, is expected to raise the KW capacity of these plants from 20 megawatts to 30 within the next few months.

The Cities Service Heat Prover has played a major role in this improvement program. It is used extensively to examine combustion conditions in the furnaces, check station instruments, and guard against air infiltration through boiler

settings and duct work, thus enabling plant personnel to operate the equipment constantly at design efficiencies or better.

Says Power Superintendent, Robert Hein: "The portable Cities Service Heat Prover has proved invaluable in our operation. We are now using 150,000 tons of coal per year and operating at boiler efficiencies around 86%. By giving us a quick, accurate check on our firing conditions, the Heat Prover has been directly responsible for much of this record."

The Heat Prover is supplied and maintained free by Cities Service. For further information write Cities Service Oil Co., Sixty Wall Tower, New York 5, N. Y.



Calumet Reclamation Operation reclaims stamp sands processed years ago and dumped into lake. Further processing will extract copper. For power, dredge relies on the Calumet Division's Lake Linden Power Plant.



Taking Readings With Heat Prover
has helped Calumet Division achieve 86%
boiler efficiency. Will aid further in rais-
ing KW capacity from 20 to 30 mega-
watts. The unique instrument enables
maximum heat benefits from coal.

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TECHNICAL BRIEFS

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SPECIAL EQUIPMENT industrial furnaces, ovens, gas generators, and dryers—all fuels—field or shop erected.

PRODUCTION LINES tailored to individual needs requiring minimum labor for maximum output.

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30 Years' Extensive Experience

insures prompt service in planning and production by experienced engineers who know industry's problems. Our numerous sales and service centers keep in constant touch throughout all phases of the work.

Write for Booklet No. 135

This booklet covers the scope of CONTINENTAL Service. It is well illustrated with views of CONTINENTAL installations with descriptions of the equipment and the processes performed.



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mill of Pittsburgh Steel Co., Allentown, Pa.

At the plant hot rolled steel is cold rolled as thin as 1/40 of an in. and up to 60 in. wide. When processing is completed, the steel is ready for shipment in coils or stacks of sheets. This means that packaging is closely integrated with production. For instance, cut-to-length sheets flow directly from the production line to a centralized packaging station. After stacking, weighing and wrapping, cut-to-length sheets are strapped into bundles with Acme Steel's hydraulic steel strapping equipment.

Uniform Bundles

These power operated tools take much of the manual effort out of applying heavy duty steel strapping. Hydraulic power does the work of tensioning and sealing quickly and easily. Each strap is applied with the same predetermined tension, insuring that bundles are uniformly tight. In addition, the hydraulic tools use strapping directly from the coil rather than cut-to-length. This permits greater operating efficiency and more economical use of strapping. Electrically powered band dispensers feed out any required length of strapping. After strapping is completed, bundles of sheets are moved to the shipping room floor for storage or shipment.

Methods:

Powder nozzle simplifies concrete cutting

Cutting concrete with a standard industrial powder-cutting blowpipe is possible with a powder nozzle recently developed by engineers of Linde Air Products Co. Using the new powder nozzle, clean, straight cuts can be made in concrete, on both the vertical and horizontal planes.

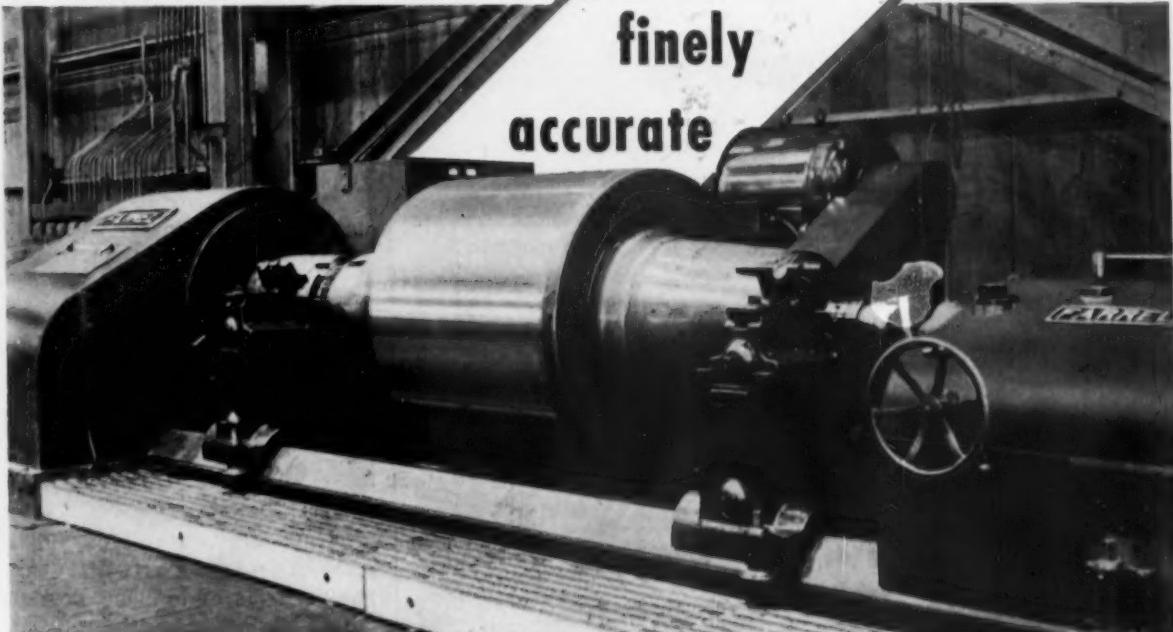
This operation was completed without interrupting the normal work routine of the factory.

A powder-cutting blowpipe was used to slice up a 43 x 20 ft. square, double reinforced con-

Roll grinding at Youngstown Sheet and Tube

is both
fast
and
finely
accurate

One of two 60" X 16'0" Farrel heavy duty roll grinders in Youngstown Sheet and Tube's cold reduced sheet mill at the Indiana Harbor Works.



WITH two Farrel® heavy duty roll grinders at the Indiana Harbor Works, Youngstown Sheet and Tube Company has been able to evaluate the performance of these machines.

They find that the Farrel machines will grind straight, convex or concave contours to exact symmetry and accuracy . . . without marks of any kind . . . in minimum time. In addition, experience has shown that these grinders are easy to handle, both in setup and operation.

Contributing to grinding accuracy is the Farrel automatic crowning and concaving device. Easily and quickly set, it requires no manipulation during operation. The same setting produces exactly

the same curvature and permits fixed, uniform and easily controlled accuracy of contour in all rolls.

Farrel heavy duty roll grinders are designed to take heavy cuts for rough grinding and to grind rolls to the highest mirror finish. They are made in six sizes for maximum roll diameters of 24", 28", 36", 44", 50" and 60", any length required.

If you would like to reduce grinding time and cost, and refinish your rolls more accurately, look into Farrel grinders. Send for detailed information.

FARREL-BIRMINGHAM COMPANY, INC.
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LACLEDE-CHRISTY does it again!

What more can you ask? Laclede-Christy Silica Brick completed 224 heats in the roof of a 250 ton open hearth furnace at a leading midwest steel mill. Based on a year's average, Laclede-Christy out-lasted other silica brick by 27 to 67 heats—for an average savings of *at least* 30%!

Is this the kind of refractory service you're looking for? Your source of supply—Laclede-Christy—is nearby.

LACLEDE-CHRISTY COMPANY



DIVISION OF H. K. PORTER COMPANY, INC.

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Mission 7-2400



crete structure in a factory building in New York. Used to house giant tanks, the structure had not been removed sooner because its design and location made it impossible to blast without causing considerable damage to the adjoining sections of the building.

By using powder-cutting, all 2,928 sq. ft. of concrete were removed quickly and efficiently. The 10- to 18-in. thick concrete walls were cut into easy-to-handle squares, and hoisted on to waiting trucks without even interrupting the normal operations of the factory.

Powder Added

In powder-cutting, a metallic powder is added to the oxyacety-



Powder injected in flame, nozzle design, both aid cutting.

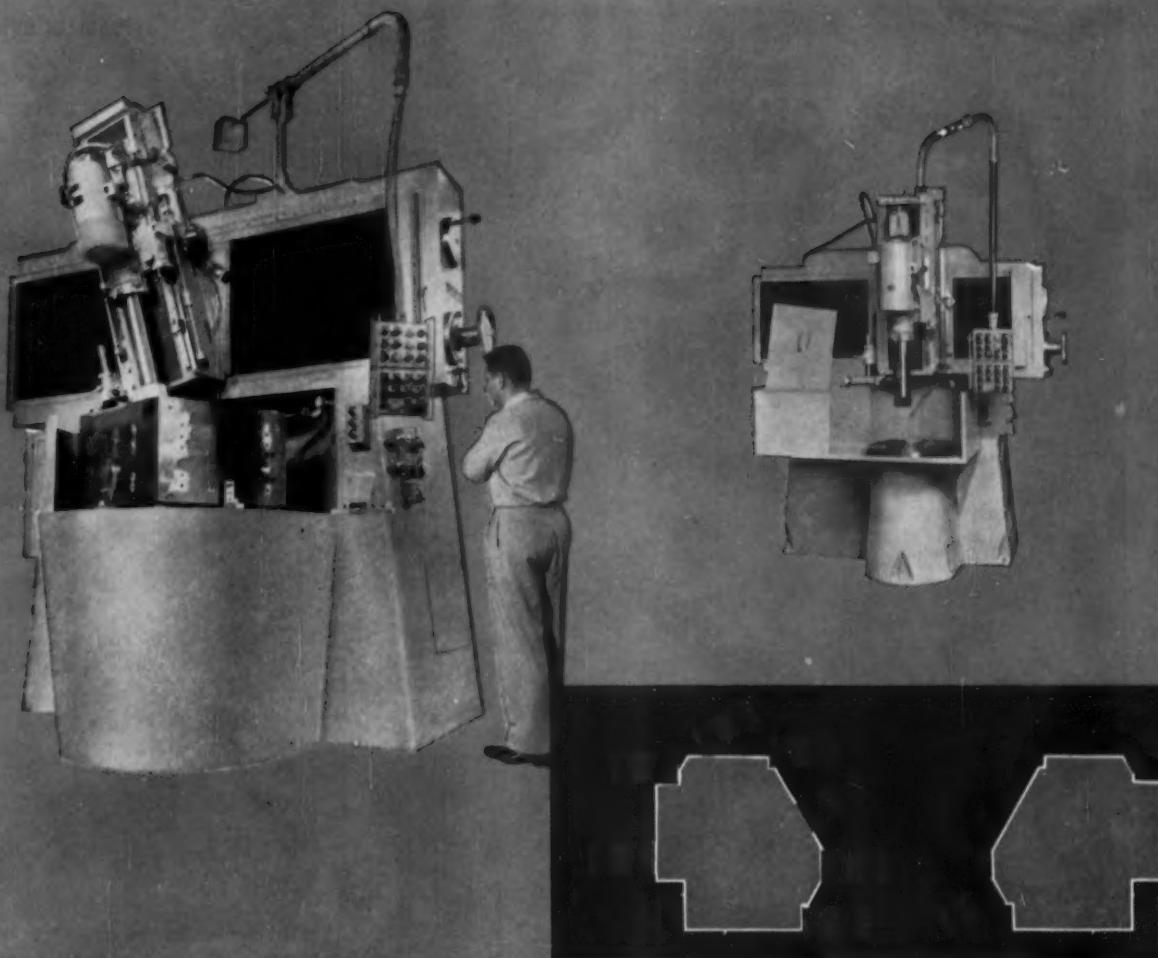
lene cutting flame. This increases the flame temperature, which in turn increases the speed and range of the cutting action. The powdered metal is injected into the flame automatically from a powder dispensing unit. Equipped with the new powder nozzle, a powder-cutting blowpipe is designed to cut cement, concrete, and reinforced concrete. Cutting speeds vary according to the thickness of the material.

Slitting:

Carbide knives outperform 20 to 1

Carbide metal slitter knives for rotary slitters in paper cutting operations are out-performing other knife materials better than 20 to one.

Field tests conducted by engineers of General Electric Co.'s



one setup: nine jobs

As flexible, as responsive as a dentist's drill, a Springfield Vertical Universal Grinder can reach around and into a workpiece to do nine different jobs on one chucking.

If you make a pipeline valve, a mold, a bearing race—requiring micro-inch finish on any or all the faces shown in the diagram—at whatever angle—look into Springfield. These grinders cut down the number of set-ups, frequently eliminate hand-lapping, operate with fewer work-holding devices. And, as a bonus, on jobs calling for extreme concentricity, one angle setting of the Springfield head grinds both faces of mating parts.

All three models readily adaptable to special problems.

Vertical Universal Grinders: swings 18", 24" and 42".

Lathes: Engine and tool room, contouring and reproducing—swings 14" to 32".

The Springfield Machine Tool Company
Springfield, Ohio

65TH YEAR OF BUILDING IDEAS INTO MACHINE TOOLS

TECHNICAL BRIEFS

Carboloy Dept., Detroit, show that one set of 25 carbide knives already has been in continuous operation slitting matchbook covers for more than 200 eight-hour work days. During this period the carbide cutters received no attention, and had not been removed from the slitter stand. An average of 13 days was obtained with steel knives operating under similar conditions.

Fringe benefits due to the use of carbide included savings in setup and resharpening time.

Other Applications

Thus far the carbide knives have been tested for slitting matchboard cover stock with and without the friction strip. Also additional testing on a limited basis indicates that carbide can be applied successfully to slitting other soft materials, such as coated and kraft paper, cellophane, plastic and metal foil.

Shear type rotary slitters are widely used in the paper and packaging industry. The knives are mounted in sets of an upper and lower shaft, and are spaced to slit wide sheets of stock into narrow ribbons. The lower knives rotate in a fixed position, while the upper ones are spring loaded so lateral pressure assures constant contact with the lower knives. Since the knives overlap, a shear-type cutting action occurs as the paper is fed through.

4-in. Diam Slitters

The slitters tested with carbide were four in. in diam. Construction consisted of a carbide ring bonded to a steel shank. In such an application, engineers point out, the cutter may be solid or cemented, depending upon the economics of the design. Rotary slitters in use by paper and related industries vary in size from about two to 10 in.

When using the cemented design, the carbide can have as thin a wall as can be economically manufactured. Where the cutting edge is restored by grinding the side of the cutter, Carboloy engineers recommend that a minimum wall thickness be specified.

flexible design
cutting accuracy
continuous feed
rugged construction

Automatic Shears

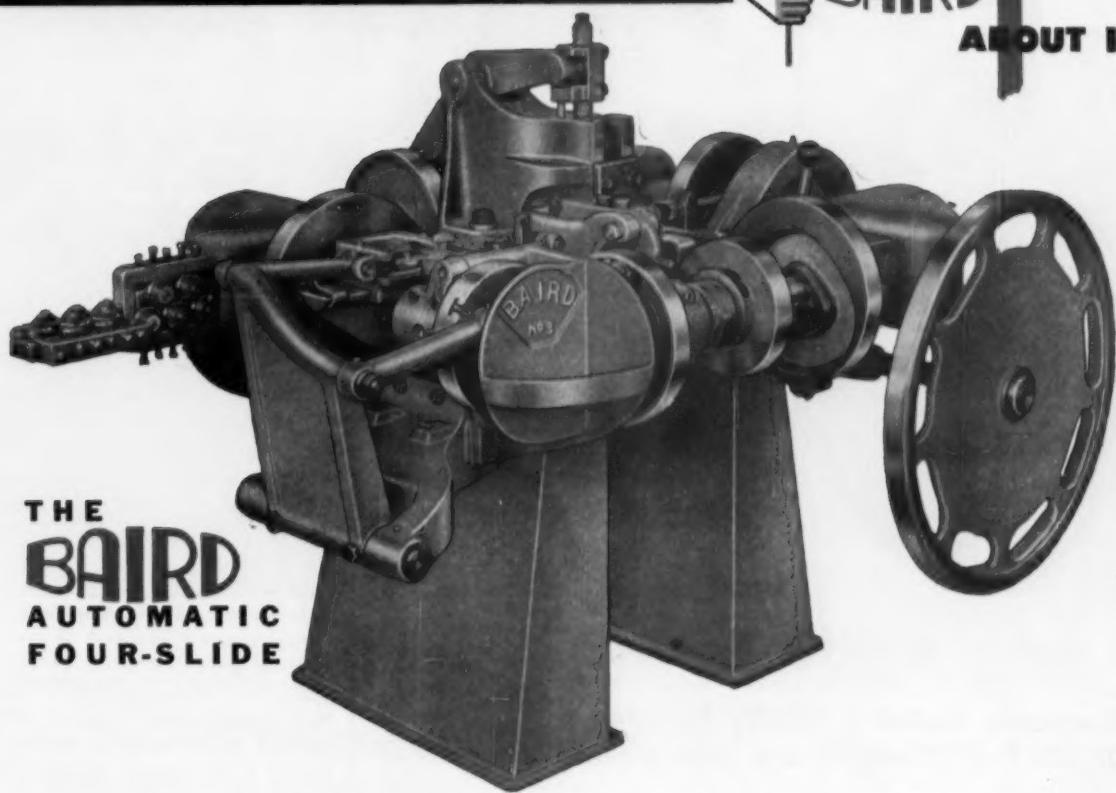
by HALLDEN

"the shearing specialists"

THE HALLDEN MACHINE COMPANY
THOMASTON, CONNECTICUT

Sales Representatives:
The Wear Engineering Co., Inc. (Ferrous) Warren, Ohio
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... IF IT'S A HIGH PRODUCTION PROBLEM ...



THE
BAIRD
AUTOMATIC
FOUR-SLIDE

NO MACHINE IN THE WORLD CAN MAKE A GREATER VARIETY OF PARTS . . . OR PRODUCE THEM ANY FASTER

Yet, new wire shapes, formed *by hand*, are continually submitted to us for tooling setups to produce them *automatically* on Baird Four-Slide Machines. We usually solve the problems.

Coiled wire is taken from a reel, is straightened, fed and cut off to the required length . . . then formed and ejected as a remarkably accurate part. The per-minute speed of production is almost unbelievable . . . and the unit cost likewise.

You may purchase your machine tooled for specific repetitive production, then add other tooling and attach-

ments as required to increase the versatility of production of both wire and metal ribbon articles to the greatest degree.

Various sizes of standard machines give you a selection of wire lengths to 32½" . . . dia. to ½" . . . or flat ribbon metal products to 1½" wide.

Baird engineers will develop your tooling from your parts or from blueprints. The Baird Four-Slide Bulletin (Wire or Ribbon Metal) will open new avenues to low-cost competitive production. Your copy on request—write Dept. IA.

THE BAIRD MACHINE COMPANY
STRATFORD CONNECTICUT

WHERE YOU WILL GET THE HELP OF SPECIALISTS
ON THESE ESSENTIAL PRODUCTION PROBLEMS:

SEARS

TECHNICAL BRIEFS

Forging:

Closed die press cuts parts cost

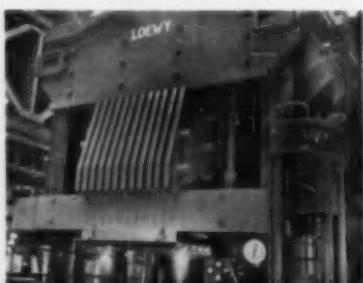
A closed die forging press of 10,605 ton with a 50,000 ton pressing power is enabling Lockheed Aircraft Corp. to obtain landing gear support ribs with less cost and material and without sacrificing strength.

The press—on the production line at the North Grafton, Mass., plant which Wyman-Gordon Co. operates for the U. S. Air Force—is making aluminum landing gear support ribs for Super-Constellations.

Other Forgings Planned

It will furnish other forged parts for the Super-Constellation beside the landing gear support ribs, a Wyman-Gordon spokesman said. Each rib will be 105 in. long and nearly 28 in. wide, more than 4 in. at its thickest part and $\frac{1}{4}$ of an inch at its thinnest.

Lockheed engineers could not say how many bits and pieces the landing gear support ribs represents, but estimated that by using the closed die forging press method, a substantial saving in money and material without loss in strength, is expected.



This press enabled aircraft parts production to be simplified.

The closed die forging presses are said to produce plane components with close tolerances and less material, requiring less costly machining and reducing waste to a minimum.

The 50,000-ton press was engineered and built by the Loewy Construction Company, Inc., of New York.



AND NOW!

A WETPROOF DIAL INDICATOR

Completely Sealed — Wholly Protected from Coolant, Oil, Oil Fog, ("Smog?") and other Liquid Contaminants

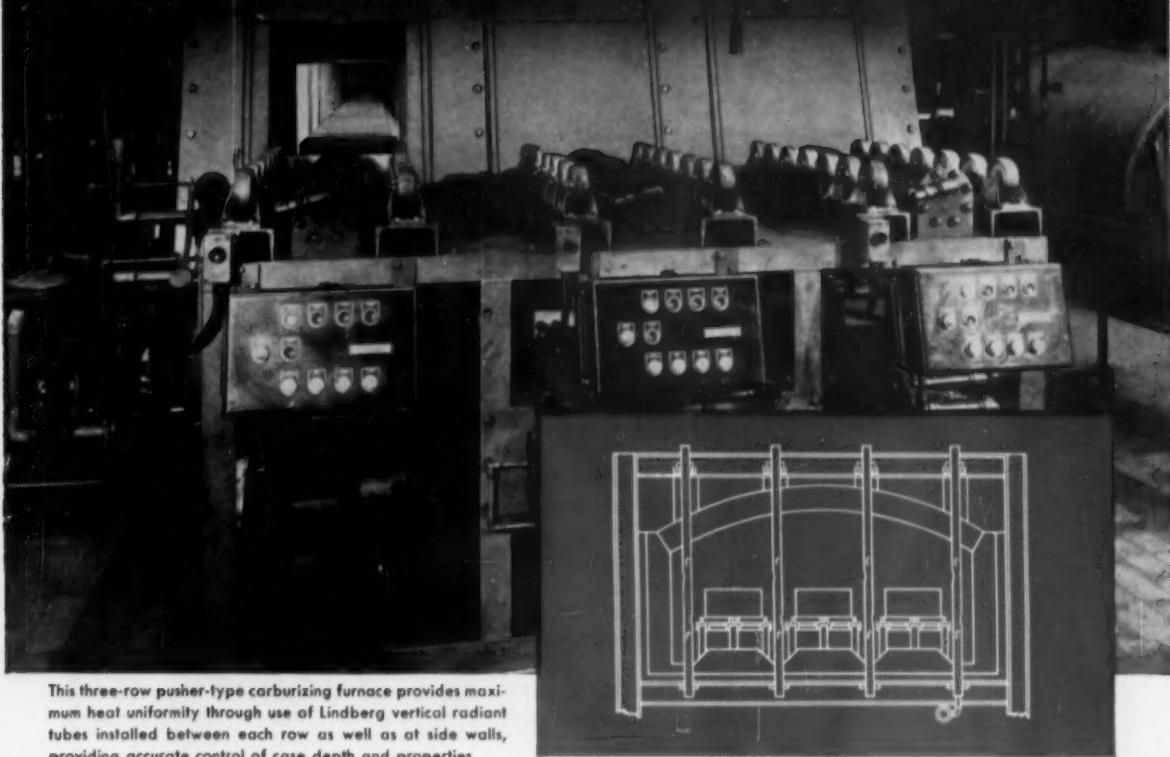
IN ANSWER TO REPEATED REQUESTS from Dial Indicator users, Federal now announces this WETPROOF DIAL INDICATOR which eliminates maintenance troubles commonly encountered under the adverse operating conditions on machine tools. The W Series Dial Indicators are completely wetproofed and built unusually rugged to withstand heavy handling. THE CRYSTAL IS OF GLARE-PROOF GLASS which is remarkably free of halations and will not discolor when exposed to oil or other staining liquids. The dial is double, with a revolution counter optional. After setting the zero (0) by rotating in either direction, the dial can be clamped positively in position by tightening the retaining ring. The indicator spindle and stem bearing permit ranges up to .250". Made to AGD specifications (except for distance between bracket and end of contact point) in our regular "C" size (2 $\frac{1}{4}$ ") Indicator with Cushion Movement and certain modifications to improve performance. TRY THIS NEW INDICATOR ON YOUR WET JOBS. Write

FEDERAL PRODUCTS CORPORATION
Dept. 15A • Providence 1, Rhode Island

Ask **FEDERAL**
FOR ANYTHING IN MODERN GAGES...

Dial Indicating, Air, Electric, or Electronic — for Inspecting, Measuring, Sorting or Automation Gaging

Heavy case depth held within .002" uniformity



This three-row pusher-type carburizing furnace provides maximum heat uniformity through use of Lindberg vertical radiant tubes installed between each row as well as at side walls, providing accurate control of case depth and properties.

New Efficiency in Carburizing With Lindberg Vertical Radiant Tubes

This highly efficient furnace with Lindberg vertical radiant tubes carburizes 650 lbs. of gears per hour with an effective case of .055". Case depth is held within .002" uniformity. Gears range up to a maximum diameter of 15" and 30 lb. weight. In this operation, furnace is adjusted to .80% carbon but can be set to control content of the case at any level desired.

Furnace rows are equipped with five zones of control, Zones 1, 2 and 3 operating at 1700° F. for carburizing. In Zone 4, at 1700° F. for diffusion, atmosphere is adjusted to the carbon content specified for the case. In Zone 5, temperature drops to 1500° F. for quenching.

An endothermic carrier gas atmosphere enriched with a hydrocarbon gas is used and gears are Gleason Press quenched.

The Lindberg vertical radiant tube used in this installation weighs only 36 lbs, is only 84" long. Can be changed easily in a few minutes.

Exclusive "dimple" design insures uniform heat over designated length of tube.

Special green silicone enamel coating resists carburization and lengthens tube life.



For any type of industrial heating or processing operation, Lindberg provides a complete analyzing, designing and construction service including completed installation in your own plant. To get immediate, on-the-spot service from an expert Lindberg engineer call your nearest Lindberg Field Office (see classified section of your telephone book) or write us direct.

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another revolutionary development by La Salle

THE **NEW**

... gives

HIGH STRENGTH...

"FATIGUE-PROOF" steel bars offer high strength in-the-bar . . without the expense and trouble of heat treating. Tensile strength is in the 140,000 to 150,000 p. s. i. range . . hardness which is related to this strength level is approximately 30 Rockwell "C."

"FATIGUE-PROOF" has uniform strength across the bar . . no soft centers. (This uniformity is maintained from bar to bar . . lot to lot.) This remarkable uniformity of strength makes "FATIGUE-PROOF" ideal for applications in the 140,000 to 150,000 p. s. i. range that formerly required heat treated carbon and alloy steels, either hot rolled or cold drawn.

With "FATIGUE-PROOF" you'll get the advantages of heat treating . . none of the disadvantages. In short, you'll get a better part at lower cost.

... yet it's

EASY TO MACHINE

"FATIGUE-PROOF" is a free-machining steel bar . . without question. It machines at least 25% faster than annealed alloys . . 50% to 100% faster than heat treated alloys.

"FATIGUE-PROOF's" excellent machinability permits faster speeds, heavier feeds, better tool life . . your production rates will increase . . you'll get more parts per hour.

Distortion from machining is held to a minimum . . there is no reduction of tool life due to the higher speeds and heavier feeds . . and surface finish is greatly improved.



La Salle STEEL CO.

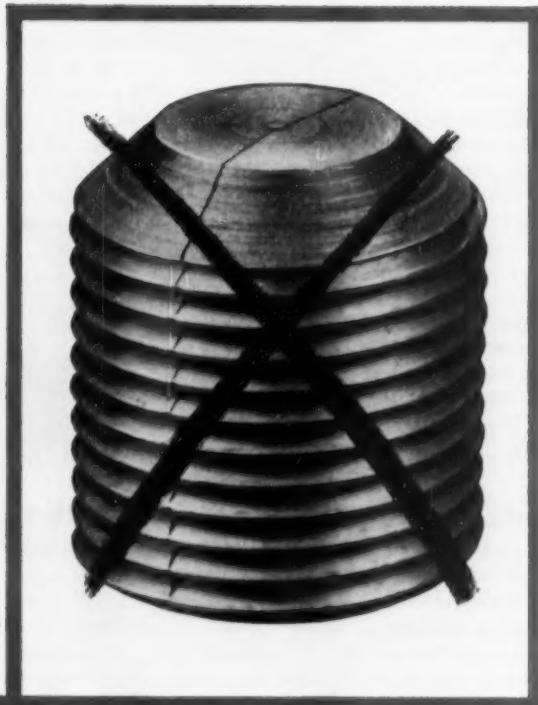
1436 150th Street, Hammond, Indiana

Manufacturers of America's Most Complete Line
of Quality Cold-Finished Steel Bars

fatigue-proof

STEEL BAR

WITHOUT HEAT TREATING



JUST PUBLISHED! Ask for your copy of the new 20-page booklet which gives additional information on the remarkable new "FATIGUE-PROOF."

- *no quench cracks*
- *no distortion from heat treating*

With heat treating eliminated, the problems that accompany heat treating are avoided. Quench cracks become a thing of the past. Distortion and warpage from heat treating don't occur . . . consequently time consuming and costly straightening and cleaning operations are not necessary.

You eliminate not only the cost of heat treating but also its disadvantages.

If you have parts where strength is a requirement . . . you can save money and get away from problems by using "FATIGUE-PROOF." Our Sales Engineers will be happy to show you how this can be accomplished and provide samples for test purposes.

LA SALLE STEEL CO.

1436 150th Street
Hammond, Indiana

Please send me your "FATIGUE-PROOF" Bulletin.

Name _____

Title _____

Company _____

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City _____ Zone _____ State _____

NEW EQUIPMENT

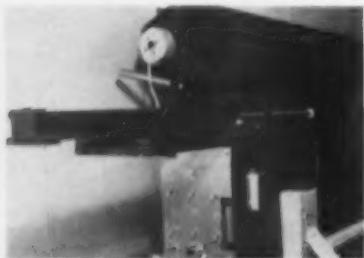
New and improved production ideas, equipment, services and methods described here offer production economies...for more data use the free postcard on page 117 or 118

Press feed for coiled stock easily adjusted

The feed stroke of a hydraulic gripper type punch press feed can be adjusted by a small hand wheel while the unit is operating. Models of the unit are available for handling stock up to 36 in. wide x 3/16 in. thick for feed lengths up to 36 in. long. All models are adjust-

able to take narrow width stock and for infinite feed stroke length from 0 to the maximum of the unit. A limit switch mounted on the press energizes a solenoid which starts the feeding cycle. *Special Engineering Service, Inc.*

For more data circle No. 27 on postcard, p. 117



Increased heat treat furnace capacity

A new line of heat-treating furnaces has been made available in which loading, heating and quench capacity has been increased. Typical of these new A Series furnaces is the T-700-A model. It incorpo-

rates ceramic tubes and redesigned elements and burners planned for generating higher operating temperatures. A new fan design aids circulation. *Ipsen Industries, Inc.*

For more data circle No. 28 on postcard, p. 117

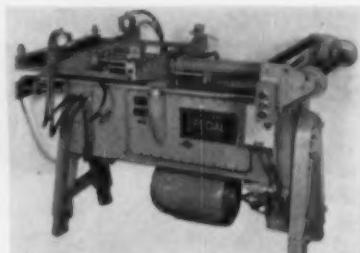


Lapper grinds hardest carbide tool inserts

Designed to completely grind carbide tool inserts and throw-aways, a new multiple tool lapper uses domestic abrasives to provide a finish on the hardest grades of carbides, which are reported to make possible more cuts per tool. The lapper is semiautomatic, re-

quiring only loading and unloading. Machine is furnished with one set of three tool holders, one charge of abrasive, and loading fixture. It requires 18 in. x 24 in. bench space, and operates on 110 v. ac current. *Empire Corp.*

For more data circle No. 31 on postcard, p. 117

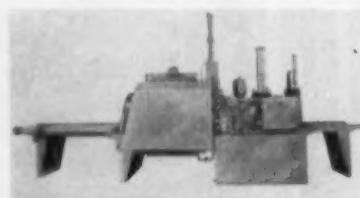


Detector spots strip pinholes of 1 mil diam

A new model pinhole detector for strip steel is reported to detect holes down to 1 mil diam in opaque strip measuring 10 mils or less in thickness. It is designed to function with maximum sensitivity at strip speeds up to 2000 fpm. This new model provides a 10-fold in-

crease in light source intensity by replacing an array of 21 small projection lamps with a single mercury vapor lamp with an output of more than 25,000 ft candles. This makes possible high sensitivity to angular holes also. *General Electric.*

For more data circle No. 29 on postcard, p. 117



Smooth lapping machine operation with clutch

Smooth, dependable power input is said to be insured on single-face flat lappers with an automatic clutch. The clutch uses inertia-delay principle for loadfull starting. Electric motors powering the lappers develop maximum torque during start-

ing period, when direct coupling is least effective and torque requirement greatest. Clutch slips constantly during excessive over-load, preventing motor and wiring damage. *Automatic Steel Products, Inc.*

For more data circle No. 30 on postcard, p. 117





**How a
shift in
gears saved
\$256,000**

**Five million MUELLER BRASS CO. forged ring
gears improve automatic transmission oper-
ation . . . at lower cost to the manufacturer.**

Ever since one of the leading manufacturers of automotive transmissions began using ring gears forged from Mueller Brass Co. bearing bronze, production costs have been cut nearly \$256,000. That's because the rough forging weighs less and is closer to finished size than a sand cast ring gear formerly used. This shift in gears resulted in a savings in metal costs, greatly reduced machining time and increased tool life. In addition, the use of forged gears has cut scrap loss and eliminated costly inspection rejects.

The performance of these forged ring gears is also far superior to the sand cast gear, which had a tendency to flake away and crack around the teeth, causing failures. More than five million forged ring gears have now been used in these transmissions without a single failure. Being porous, the sand casting was difficult to balance, but the forging has a dense, homogeneous structure that helps keep it in perfect balance.

Strong, long-wearing non-ferrous metal parts, forged to your specifications by Mueller Brass Co., can help reduce your costs and improve the performance of your products just as they have done in this transmission application. For complete information, write us today.

Write today for your complete set of Mueller Brass Co. engineering manuals.



MUELLER BRASS CO. PORT HURON 24, MICHIGAN

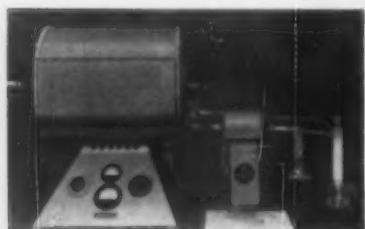


Drillhead performs three operations on two parts

A 36-in. spindle drillhead is used for drilling, reaming and counter-boring two dissimilar parts at the same time. The unit includes drill bushing plate, index table and fixtures. Its four station ball bearing index table is manually operated

with three stations used for machining and the fourth for loading and unloading. All 36 spindles have vertical and depth adjustment. Each is operated at the desired speed. *Thriftmaster Products Corp.*

For more data circle No. 32 on postcard, p. 117

**Combination grapple-magnet increases pickup**

Two to three times as much pickup capacity as a grapple, magnet or clamshell bucket alone, is provided by a new combination grapple and magnet. Designed for handling baling material, small loose material, prepared scrap or for clean-up, the

grapple-magnet relies on four keenly-pointed tines to achieve improved penetration into all types of scrap metals. The unit is designed to fit in an 8-ft truck body. *McCaffrey Co.*

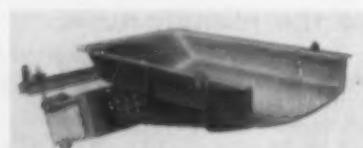
For more data circle No. 34 on postcard, p. 117

New determinator for detecting hydrogen

A new hydrogen determinator, said to reduce the time of determination to 20 minutes in such metals as titanium, zirconium, cerium, tantalum, niobium, molybdenum, tungsten, nickel, cobalt and their alloys, is now available. The unit deter-

mines hydrogen in concentrations as low as 0.003 pct and as high as those occurring in metal hydrides. Carbon and sulphur content can also be determined with unit. *Ledoux & Co.*

For more data circle No. 33 on postcard, p. 117

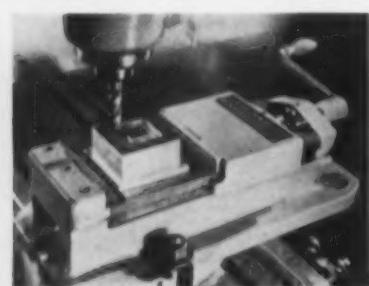
**Profiling machine of straight plane design**

A profiling machine, the Reciprofiler, is built on a straight plane design and held like a common hand file. A special detachable grip handle is provided for use when desired. Driven by a flexible shaft from a variable speed motor, the

An optional dust-tight design for a heavy-duty vibratory feeder is offered to prevent dust or spillage from a supply hopper impairing the smooth feeding action of the elec-

tromagnetic drive. The feeder itself has a 48 in. x 60 in. flat pan trough and a max capacity of 500 tons per hr. *Syntron Co.*

For more data circle No. 35 on postcard, p. 117

**Hold-down vise for milling operations**

Hold-down vise has automatic pull-down jaws which grip the work $\frac{1}{8}$ in. from the bottom permitting easy milling of the sides to the $\frac{1}{8}$ in. shoulder. The operator needs only to place the work-piece on the base of the vise and tighten by hand. Jaws may be readily revolved for easy cleaning or replaced with

special jaws for irregular work, by the removal of the hinge pin. The standard vise opening is 4 in. However, a stretching block may be purchased to give the vise a full 6 in. capacity, while a swivel base is also optional equipment. *Illinois Metal Products.*

For more data circle No. 37 on postcard, p. 117

AIR engineering at work
REPORT No. 4271.10

Slugger "Pinch-hits" for Battering Ram... SAVES \$13,000...

Six men spent 21 hours removing nuts from 54 five-inch diameter bolts on this hydro-generator rebuilding job. An 800 lb. battering ram was used to remove the nuts, which held three drive shaft couplings together between water wheel and generator.

It took seven men another 24 hours to tighten the same nuts with the battering ram. Down time on the generator cost \$300 per hour. The problem was how to run the nuts faster and with less manpower.

AIR engineering was put to work. A Size 588 Slugger Impactool "pinch-hit" for the battering ram. Two men then removed all the nuts in 1½ hours, and put them on again in 2 hours, saving 286½ manhours and 41½ hours down time. With nearly \$13,000 saved on its first job, the Slugger now has a "full-time" job.

If you in any way influence production or maintenance cost-savings in your plant, it will pay you to see I-R's confidential manual of reports on "AIR engineering at work". Write on your company letterhead, and we'll make arrangements for you to see it soon.

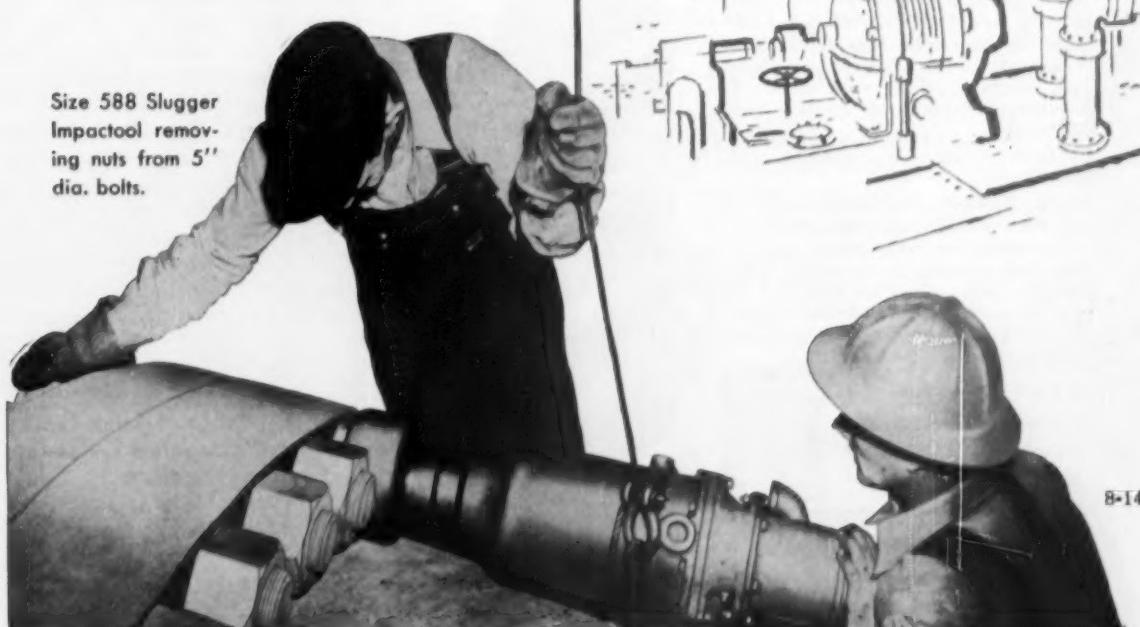


AIR engineering Manual

Over 100 interesting and helpful case history applications of AIR engineering at work.

Ingersoll-Rand
11 Broadway, New York 4, N.Y.

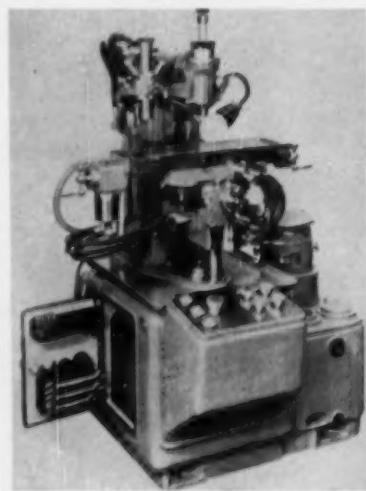
Size 588 Slugger Impactool removing nuts from 5" dia. bolts.



NEW EQUIPMENT

Automatic profiler

A fully automatic profile milling machine has been introduced for three dimensional automatic copy milling of dies, forging dies, plastic dies, rubber and glass moulds, turbine blades and all work pieces of irregular shape. The Hydrotracer copying valve controls from a master rise and fall of the knee and also the speed of the table traverse. Speed of these movements is set by hand controls. The Hydrotracer



will provide a constant rate of feed relative to the form being copied and will allow cavities with vertical faces to be copied automatically with complete safety and high accuracy. The table is reversed at the end of each stroke by adjustable stops. It has automatic infinitely variable cross feeds of 0.005 in. to 0.250 in. Spindle and spindle drive gears are high alloy steel, for high accuracy and rigidity. Cutters up to $\frac{1}{2}$ in. diam may be used with efficiency. The alignments are close, the spindle at the nose 0.0002 in., the table overarm and knee 0.0005 in. per ft. *Wickman Products Corp.*

For more data circle No. 88 on postcard, p. 117

Zinc brightener

Quick, one dip brightening treatment for zinc is called Luster-On M. Used in very dilute 2% solution, it gives a bright, attractive finish with good corrosion protection. *Chemical Corp. of Springfield, Mass.*

For more data circle No. 89 on postcard, p. 117



When you purchase FASTENERS, your first considerations should be given to quality, delivery and prices. Chandler, as a leading manufacturer of cold forged cap screws, takes the same considerations. Mass production is only part of their story . . . but absolute control during every phase of production means top quality and uniformity.

Realistic pricing is important . . . and is followed.

If your requirements include automotive, Place self-locking, connecting rod or aircraft engine bolts in high carbon alloy and stainless steels, check with Chandler today. They are prepared to produce special heads, drilled heads and shanks, and ground bolts to tolerances as close as 0.0005-inch.

Write today for literature.

Specialists in Thread-Rolling after Heat Treating.



CHANDLER
PRODUCTS
CORPORATION

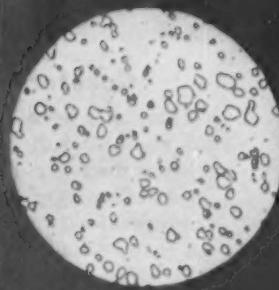
1434 Chardon Road • Cleveland 17, Ohio



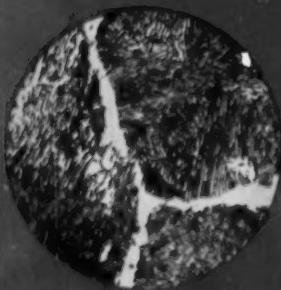
6478-CH



consistent uniformity!



SPHEROIDIZED . . .
for easier cold forming



PEARLITIC . . .
*for easier blanking
procedure*



WEIRTON

high carbon strip cold-rolled spring steel

Manufacturers throughout the nation find Weirton cold-rolled spring steel consistently produces best results in a wide variety of products.

Weirton supplies spheroidized-annealed cold-rolled spring steel for operations where superior forming qualities are necessary. Simple and economical fabrication is assured by the exceptional ductility of the controlled grain structure.

Where clean, economical blanking is the major requirement, Weirton supplies pearlitic steel structure that is temper-rolled in controlled hardness and tensile strength.

Both structures are available for specific heat treating and hardness. And in both structures, Weirton high carbon cold-rolled spring steel possesses five highly important characteristics: 1. Uniform chemical and physical properties. 2. Exact consistency of grain structure. 3. Accurate response to heat treatment. 4. Exceptional uniformity of gauge and width. 5. Controlled decarburization limits. . . Why not let Weirton help make your product better?



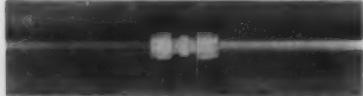
WEIRTON STEEL COMPANY
Weirton, West Virginia

NATIONAL STEEL CORPORATION



Metal joining insulators

Galvanic insulators trade-named Zytel are designed to eliminate galvanic action which results from joining dissimilar metals such as brass, aluminum, copper and steel.



They are available in a complete line of shapes. *Crawford Fitting Co.*

For more data circle No. 40 on postcard, p. 117

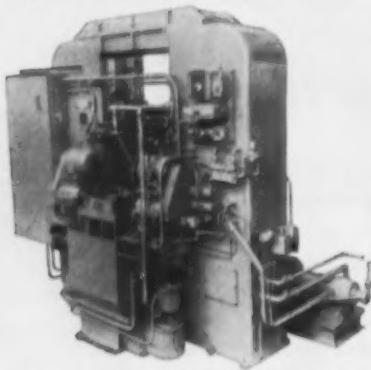
X-ray weld inspection

An X-ray unit, the Baltospot, provides spot-check radiographs up to a capacity of 1½ in. steel or the equivalent. Basic design feature of the unit is the extremely low weight-to-power ratio. Reported to be the lightest unit available for its rating, the X-ray head weighs only 46 lb and provides a power penetration of 140 kilovolt peak. *Balteau Electric Corp.*

For more data circle No. 41 on postcard, p. 117



ANOTHER American FIRST
**COMBINED BROACHING
and CENTER DRILLING**



Here, in one machine, American has combined two operations — broaching and center drilling of both ends of automotive main transmission shaft forgings, two at a time.

Two standard vertical hydraulic broaching machines were adapted to a common center table that is equipped with a hydraulically operated slide and two-station clamping fixture. Parts are automatically clamped in place, shuttled into the broaching and drilling positions, and unclamped — with the entire cycle being interlocked with electrical controls.

American engineers will be happy to recommend the broaching equipment, either special or standard, that is best for your operation. Send sample part or detailed drawing. Your requirements will get prompt attention.



Write for Catalog No. 450, American's revised informative manual of broaching machines, broaches and fixtures.

American
BROACH & MACHINE CO.
A DIVISION OF SUNSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

See *American First* — for the Best in Broaching Tools, Broaching Machines, Special Machinery



PRODUCTION:
Over 300 transmission
shafts per hour



Two parts are automatically clamped and shuttled into broaching position by hydraulic slide. Surface broach sections mounted on the two rams move down to broach approximately $\frac{1}{8}$ " of stock from each end of forged parts.

While the rams return, the slide moves back, positioning parts for center drilling of both ends. Drills move in, after which parts are automatically unclamped. Complete cycle is push button controlled.



Counter
A new twin counter unit has been developed to record production of a line of automatic screw machines. The new unit, a modification of a standard control, incorporates two separate counters. A counter sealed within the housing serves to record total job production. A second



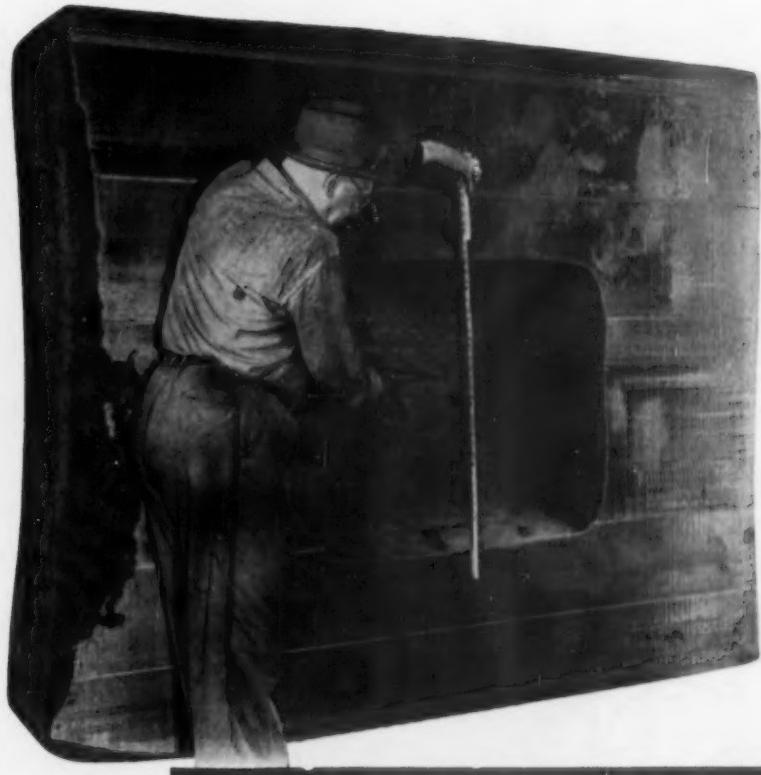
counter, this one mounted outside the case, is used to record shift production or to help keep daily records. The twin counter records only full-length parts, with short parts—occurring when bar stock in the machine — never counted. In addition, when bar stock has run out, a red light is lit and a loud warning buzzer is sounded. *Count-O-Larm Co.*

For more data circle No. 42 on postcard, p. 117

Wire ring roller

A wire ring roller will roll rings of round or flat wire, from 2 in. to 30 in. in diam. It is powered by a $\frac{1}{2}$ hp. motor which will take care of five $\frac{3}{16}$ in. diam wire. *Penn Machinery Co.*

For more data circle No. 43 on postcard, p. 117



Forged-in pockets provide tougher, stronger dies

This 35,000-pound die block, made of Finkl FX-T3 steel, has a forged-in pocket 12"x29"x34". In addition to the improved physical properties, the pocket forging increases the saving in machining time. There are many ways, such as this, that Finkl engineers can help you when planning die block or forging requirements.

When you next consider hot work tooling, die blocks or forgings, consider Finkl for the best. The quality of Finkl Hot Work Die Steels is the finest available and costs you less in the long run. Finkl die blocks will make a lasting impression with "impressions that last." Our engineers will gladly offer the advantage of their knowledge and our experience. There is no obligation.



DIE BLOCKS
•
HOT WORK
STEEL
•
FORGINGS
•
ELECTRIC
FURNACE
STEELS

Offices in: DETROIT • CLEVELAND • PITTSBURGH • INDIANAPOLIS
HOUSTON • ALLENTOWN • ST. PAUL • COLORADO SPRINGS
SAN FRANCISCO • SEATTLE • BIRMINGHAM • KANSAS CITY
Warehouses in: CHICAGO • EAST CAMBRIDGE • LOS ANGELES

A. Finkl & Sons Co.
2011 SOUTHPORT AVENUE • CHICAGO 14

Boring bar

A new boring bar is reported to reduce bending or bar deflection, while making deeper cuts with heavier feeds. Constructed of both steel and tungsten carbide, the new bar approaches a solid carbide boring bar in stiffness, yet possesses strength and resistance to failure. Currently the boring bars are being manufactured in standard sizes. *Cyma Corp.*

For more data circle No. 44 on postcard, p. 117

Bench micrometer has non-rotating spindle

A bench micrometer with a non-rotating spindle is recommended for aid in fine small parts measurements. Spindle and anvil have bores for holding different shapes

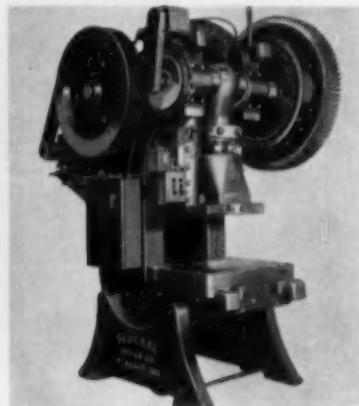


of measuring spindles. It measures by 0.0001 in. directly from the dull chrome finished oversize micrometer thimble, which is 1 1/4 in. in diam. *George Scherr Co.*

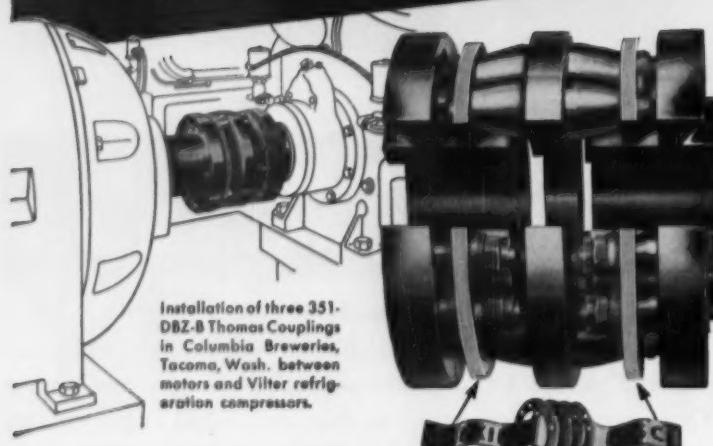
For more data circle No. 45 on postcard, p. 117

New 100-ton press

The many features of this new press permit precision operation at high speeds and with maximum safety. It is equipped with an air-actuated clutch and is electro-pneumatically controlled. Twin solenoid valves provide utmost safety. A system of lights on the control panel signals the operator that the



THOMAS FLEXIBLE COUPLINGS... for more years of better service!



Installation of three 351-DBZ-B Thomas Couplings in Columbia Breweries, Tacoma, Wash., between motors and filter refrigeration compressors.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention, Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts, Freedom from Shut-downs.
NO BACKLASH	No Loose Parts, All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment, No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling, Elastic Constant Does Not Change, Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.



Write for our new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING COMPANY

Largest Exclusive Coupling Manufacturer in the World

WARREN, PENNSYLVANIA, U.S.A.



press is in safe operating condition. The electro-pneumatic control permits instantaneous fingertip starting and stopping. The press may be single-tripped, with hand or foot control, inched, or operated continuously. *Federal Press Co.*

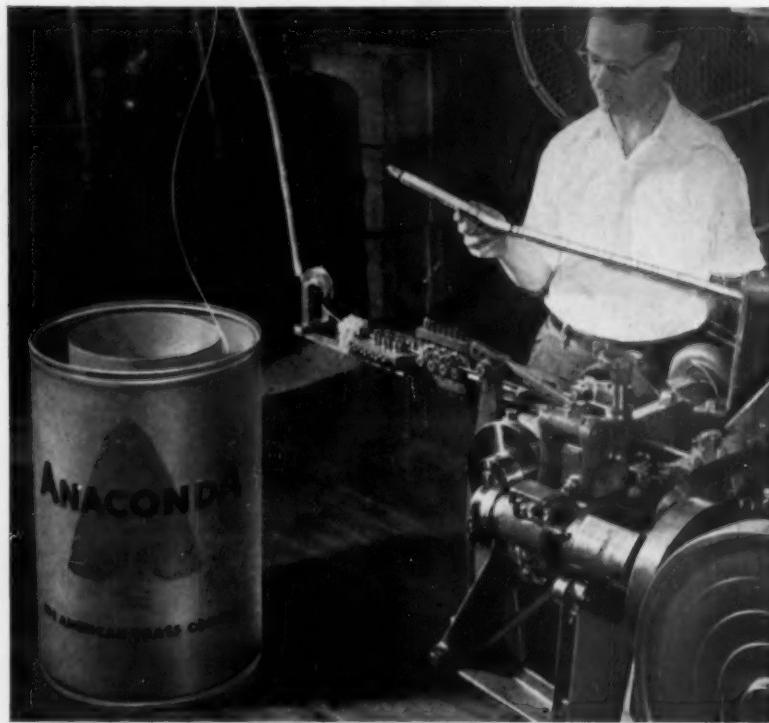
For more data circle No. 46 on postcard, p. 117

Hydraulic lift

A 2000 lb capacity, multi-purpose, manually propelled, hand or battery-powered hydraulic lift is designed to provide four carriers in one. The four units are: a platform truck, a straddle fork truck, a portable elevator and a shop crane. Features are adjustable legs which allow the carrier's legs to ride straddling the load or beneath the load; adjustable forks; and remote control as standard equipment on power operated models. *Oster Mfg. Co.*

For more data circle No. 47 on postcard, p. 117

Anaconda Wire now available in New Pay-off Container



Shutdowns to change coils in wire forming machines cut 90% at West Haven Buckle Company

The West Haven Buckle Company of West Haven, Conn., used to be limited to relatively light coils of brass wire because of the slide feed necessary for free pay-off into its wire forming machines. Machines could operate less than an hour before shutdown to feed in another coil.

When they started using Anaconda Wire packaged in the *new pay-off barrel*, which provides free pay-off, the runs were increased 10 times. The big coils of brass wire—400 to 500 pounds—made possible continuous runs of from 8 to 9 hours. This cut the time lost in changing coils 90 per cent. It eliminated the labor of shifting and lifting heavy coils—as the wire is fed directly from the barrel.

An easy way to increase production, cut costs: Big coils of Anaconda Wire in the *new pay-off barrel* give you these advantages:

1. Reduced down-time to change coils can mean production increases up to 25 per cent. Free pay-off feature may enable you to increase machine speed for still greater production.
2. Operators are freed for other duties during the longer continuous runs.
3. Easier handling, better inventory control. Barrels are clearly marked for quick identification—are easily handled by standard hand trucks—utilize storage space efficiently—can be stacked. Losses are minimized because coils stay clean indefinitely—there is no danger of coils becoming tangled or mixed.

No extra charge for Anaconda Wire in the new pay-off container. Call your American Brass Company representative today or write: The American Brass Company, Waterbury 20, Conn.



BUCKLES AND BUCKLE PARTS made by West Haven Buckle Co., West Haven, Conn., using Anaconda 70-30 yellow brass wire. Finished buckles, later nickel plated, are of highest quality, noncorroding, for use in surgical bandages, trusses, corsets and other surgical appliances.



THE NEW CONTAINER which provides Anaconda Wire in 400 to 500 pound coils, ready for free pay-off into pin machines and other automatic forming machinery. Anaconda wire in all alloys is available packaged this way for long, continuous runs—in all gages up to .090", in tempers at least one number hard.

ANACONDA®

COPPER AND COPPER ALLOY WIRE

NEW EQUIPMENT

THERE ARE 21 BASIC INDUSTRIES and *Hendrick* serves them all!

That's right! Hendrick serves every one of the 21 basic industries designated by the U. S. Department of Commerce under its Standard Industrial Classification list. If you have a perforating problem and are not already familiar with Hendrick's facilities, we stand ready to serve you, too! Whatever your needs be, if you wish to perforate metal, rubber, plastic or masonite for a screening, straining, decorative, display or acoustical application, Hendrick's long experience can be of real help. Join the long list of manufacturers who now derive untold assembling and selling benefits by using Hendrick Perforated Metal as a fabrication material. Call Hendrick today.

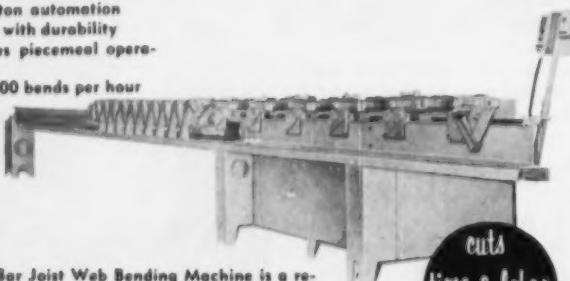
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Perforated Metal • Perforated Metal Screens • Wedge-Slot and Wedge Wire
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Announcing... the new EIDAL BAR JOIST WEB BENDING MACHINE

- Push-button automation
- Economy with durability
- Eliminates piecemeal operations
- Max. 6,000 bends per hour



The Eidal Bar Joist Web Bending Machine is a revolutionary concept in the economic fabrication of bar joists. The entire center web section is automatically bent and released in a single cycle operation of less than a minute. Methods of cutting and bending short stock are eliminated. No die markings or cross section reductions are experienced in obtaining the correct radii. Time and labor savings up to 50% have been reported. Available option: automatic loader.

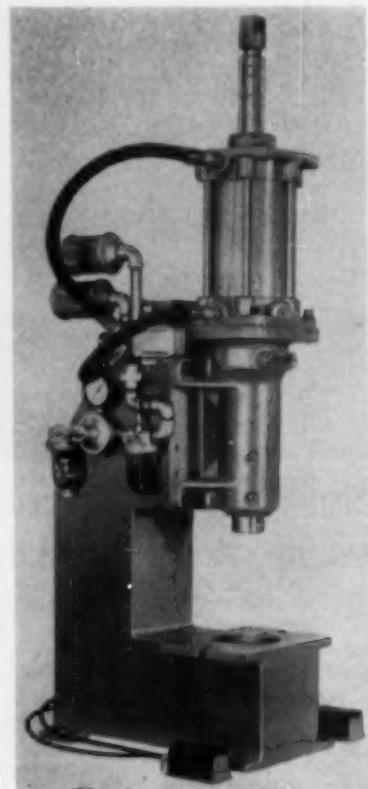
WIRE OR WRITE FOR ILLUSTRATED
BROCHURE WITH DATA ON PRICE,
WEIGHT, AND PRINCIPLE
FEATURES.



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CABLE CODE: EIDAL

Double acting air press

New double acting air press is designed to permit increased vertical heights, throat depth and ram stroke. The double acting air cylinders support unlimited upper die weights and make possible faster operating cycles. Double rod ends allow for adjustment of stroke from 0 to maximum stroke of cylinder.



Ram is supported and guided independently of cylinder piston rod and is keyed to prevent turning.
Famco Machine Co.

For more data circle No. 48 on postcard, p. 117

Welding unit

A unit designed to provide a mobile self-propelled welding installation for applications which occur at widely separate points, has the engine directly coupled to the generator. In addition to welding power, the unit can supply up to 1 kw. (110 volts dc) auxiliary power for operation of lights and electric motor powered equipment.
Hobart Brothers Co.

For more data circle No. 49 on postcard, p. 117

Within the Span of a Man's Hand

The power to transmit
the commands
of the operator
to the machine

By means of the movable PENDANT CONTROL the start and stop of the spindle; selection of speeds, feeds and directional movements of all heads in feed or traverse are quickly and easily accomplished. Interlocks and a stopall stick provide safety for both operator and machine.

Additional features include:

SCREW FEED

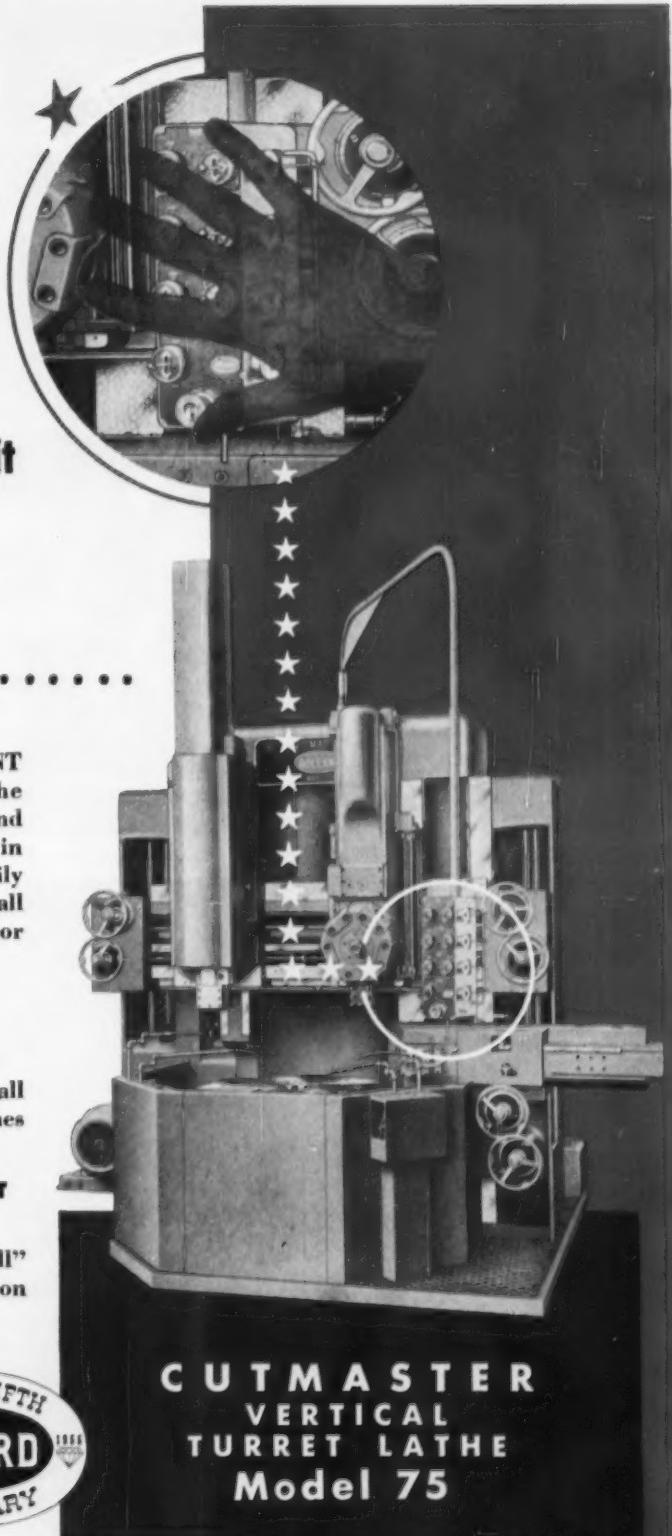
for vertical and horizontal motion of all heads — to assure fine smooth finishes with greater accuracy.

POWER INDEXED MAIN TURRET
(optional)

Five sided turret for "run of the mill" jobs. Four sided turret for production jobs.



THE BULLARD COMPANY
BRIDGEPORT 2, CONN.



CUTMASTER
VERTICAL
TURRET LATHE
Model 75

AVAILABLE IN 26,
36, 46, 56, 66 AND
76 INCH SIZES

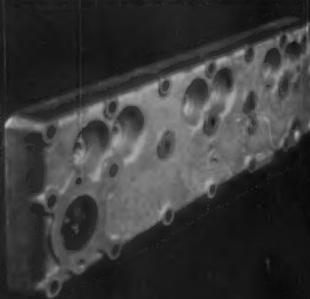
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PUNCHES * DIES * RIVET SETS * COMPRESSION RIVETER

We carry your inventory.
Large stock for your convenience.
Special tools to order.
Quality and workmanship guaranteed.
Prices on Application.
Write Dept. B for New Catalog 54

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1420-34 So. ROCKWELL STREET • CHICAGO 8, ILLINOIS

BORES MOTOR BLOCKS 22% FASTER—
AND WITH 28% LESS TOOL WEAR



...thanks to

FERROCARBO®

Users everywhere report similar experiences. In fact, on 67 machining tests in 11 large machine shops, castings of gray iron treated with FERROCARBO averaged 89.5% greater machinability per tool than untreated castings. These premium castings are finer-grained, denser, stronger, yet they COST YOU NO MORE...because your foundryman, using FERROCARBO, makes worthwhile savings in raw material costs.

FOR FREE BOOKLET on FERROCARBO, citing actual case histories of faster machining, with longer tool life, write The Corborundum Company, Dept. 44, Niagara Falls, N.Y. 14204

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QUANTITY PRODUCTION OF GREY IRON CASTINGS

ONE OF THE
NATION'S LARGEST
AND MOST MODERN
PRODUCTION
FOUNDRIES

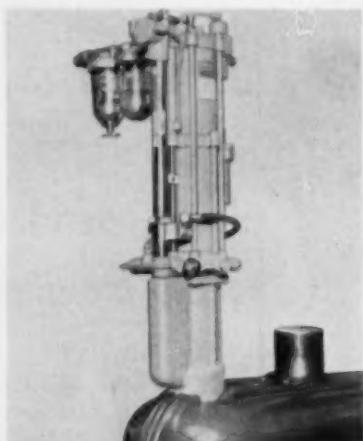
ESTABLISHED 1866

**THE WHELAND
COMPANY**

CHATTANOOGA 2, TENN.

Drill feed

An improved feed has been designed to convert any drill press into a production automatic for drilling, tapping, reaming, threading, counter-boring, spinning, spot-facing, fly-cutting and other operations. Its work cycle is air-operated and the hydraulically controlled feed is started by a foot pedal. Three control knobs adjust



precision operations. A fast approach is set by dial to any length from 0 to 4 in. Drilling depth is controlled by a micrometer type dial to an accuracy of ± 0.002 in., while dial set feed valve adjusts the drilling speed to any material hardness. *General-Pacific Corp.*

For more data circle No. 50 on postcard, p. 117

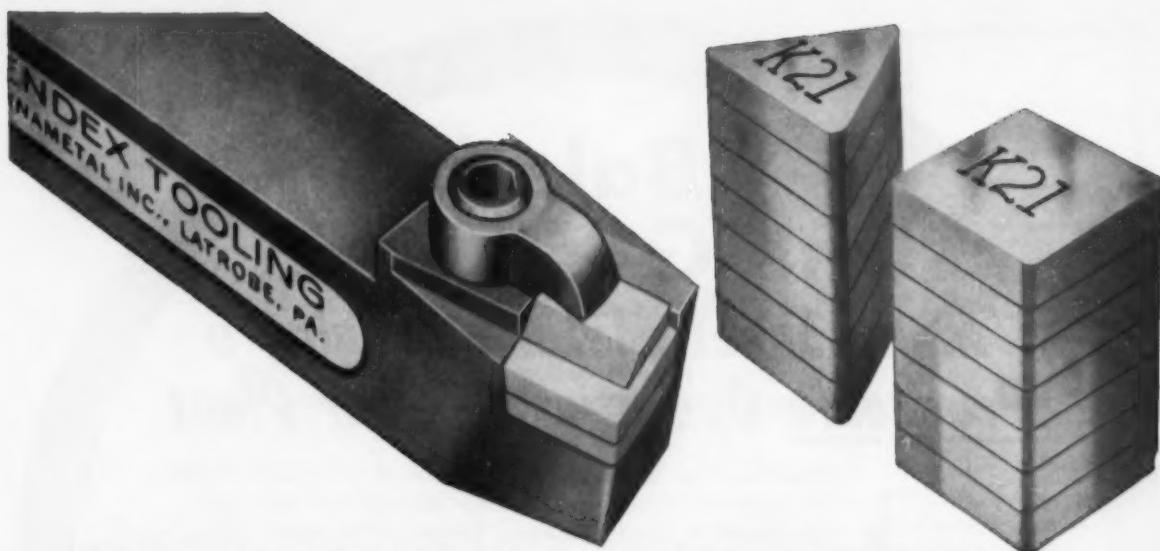
Loading ramp

A hydraulically operated 20,000 lb capacity adjustable loading ramp features manual floating which automatically compensates for spring deflection of the truck bed



during the transfer of freight. It can be used recessed, partially recessed or in front of the dock as an actual ramp. Push button control raises deck to clear the floor of an incoming carrier. Afterwards it is lowered until resting on truck bed. *Rowe Methods, Inc.*

For more data circle No. 51 on postcard, p. 117



THESE TWO RECENT KENNAMETAL* DEVELOPMENTS HELP TO MEET TODAY'S HIGH-SPEED PRODUCTION NEEDS

The profit advantages of today's high-speed automatic cycling machines for metal cutting are lost when tools wear rapidly—need frequent regrinding—or are cumbersome to index.

Kennametal recently introduced two new developments to help give you continuous machine performance, and to help step up profits in your steel-cutting operations. These developments are Kendex*† Button Tooling and Kennametal Grade K21.

Kendex "turnover" inserts, with replaceable Kennametal shims and new chip control system, double the number of cutting edges, eliminate all regrinding and index in seconds. These features help provide consistent tool performance and hold downtime to a minimum.

Grade K21 is the General Purpose steel-cutting carbide now outperforming all other medium grades in the carbide industry. Superior performance of K21 is due to exceptionally high edge strength, strong resistance to cratering and superior wear qualities. An extremely versatile grade, K21 can be applied to general steel-cutting, heavy roughing and finishing.

Kendex, in 17 styles and sizes; and K21, in popular blanks and inserts, are immediately available from stock. For their right application on your machining jobs, call a Kennametal Tool Engineer. He works exclusively with Kennametal . . . applying and servicing it. And be sure to ask for reports of Kendex and K21 repeat performances, job after job. KENNAMETAL INC., Latrobe, Pa.

*Registered Trademark

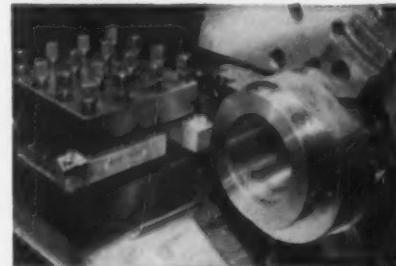
†Patent applied for

8409

PROVED BEST—TEST AFTER TEST



Kendex Tooling with "turnover" inserts cuts tool cost from \$1.20 to \$0.09 per piece, turning SAE 4140 tank assemblies.



Grade K21—on interrupted cutting, roughed and finished 6 times as many pieces as other premium carbide.

Give your machines the tools they deserve . . . the BEST



MINING, METAL AND WOODWORKING TOOLS

WEAR AND HEAT-RESISTANT PARTS



INDUSTRY AND
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...Partners in Progress



ABRASION, CORROSION-RESISTANT PARTS

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Bale It the G-H Way...

Make Sheet Metal Salvaging a Profitable Operation in Your Plant

Wherever sheet metal scrap accumulates in volume, it presents two problems: First — neat, orderly disposal with minimum disturbance to plant operation. Second — profitable salvaging.

A well integrated scrap salvaging operation, built around the right size and type of baling equipment, can solve both problems for you just as it has for many others.

The Galland-Henning Hydraulic Baling Press is fast, powerful and rugged . . . designed and constructed to convert stampings, clippings and other loose scrap into dense, compact bales at lowest possible cost per ton . . . bales that always command premium prices on the scrap metal market.

If you need help in planning Profitable Salvaging of your sheet metal scrap, you can rely on Galland-Henning for competent counsel based on years of successful experience in the design, construction and installation of scrap metal balers.

GALLAND-HENNING MFG. CO.

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GALLAND-HENNING
SCRAP METAL BALING PRESSES



The Iron Age SUMMARY . . .

Production and price problems plague steel industry . . . Price changes so far are unimportant . . . Mills are watching Washington . . . Market continues strong.

Production and Prices . . . While the big problem in steel is one of producing enough to meet demand, the steel price question smolders beneath the surface. Prices will loom larger in the weeks ahead.

If anything, the steel supply outlook is worse. Producers are straining to maintain high production levels. But there are shoals immediately ahead. Cold weather, maintenance problems, and the holidays are likely to force a break in the fast pace being set by the mills.

The usual hulabaloo about steel prices has followed recent advances in base and extra charges. But changes so far have been relatively insignificant. The larger mills have made few adjustments—and none can be charged against the need to finance expansion.

Chances are that by March 1, practically all major product prices will be changed either in terms of extras or base. But the important adjustments are still to come.

Washington Angle . . . Meanwhile, producers have one eye cocked on Washington. The possibility of being called on to explain price changes may give some mills a bad case of cold feet. There's always someone anxious to investigate

industry for almost any reason. But such a probe hardly seems likely in view of the industry's need for additional expansion capital.

It is still much more than a 50-50 chance that steel prices will rise moderately before March 1. That they will go up again after wage negotiations next summer is a foregone conclusion.

The railroads are putting on the pressure for more steel to push their freight car program—and with some success. They failed in their efforts to get priorities from Washington. But these efforts have had the desired effect on some steel producers.

Although they entered the steel market late, the railroads are getting their share of what's available. This means that other consumers will get proportionately less. And the magnitude of the carbuilding program is such that the pressure will be on for months to come.

Detroit Again . . . The automotive sales lag has developed into a nagging worry for steel mills and a sign of hope for other consumers. Chances are there will be little change in the volume of steel demanded by Detroit. At least three auto producers are in conversion, would make more deals if they could.

Steel Output, Operating Rates

Production (Net tons, 000 omitted)	This Week	Last Week	Month Ago	Year Ago
Ingot Index (1947-1949=100)	150.7	150.4	148.5	123.0
Operating Rates				
Chicago	98.0	99.0	99.0	87.5
Pittsburgh	102.0	102.0*	101.0	78.0
Philadelphia	105.0	103.0	102.0	73.0
Valley	99.0	98.0	99.0	80.0
West	101.0	102.5*	99.0	85.5
Detroit	101.0	98.0	96.0	92.0
Buffalo	105.0	105.0	105.0	100.0
Cleveland	99.0	102.0*	102.5	89.5
Birmingham	94.5	94.5	94.5	67.0
S. Ohio River	91.8	96.0*	95.0	81.0
Wheeling	106.0	103.0	104.0	88.0
St. Louis	107.0	104.0	98.0	79.0
Northeast	88.5	88.5	97.0	75.5
Aggregate	100.5	100.1	99.0	82.0

*Revised.

Prices At A Glance

(cents per lb unless otherwise noted)	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.174	5.174	5.174	4.797
Pig Iron [Gross Ton]	\$59.09	\$59.09	\$59.09	\$56.59
Scrap, No. 1 hvy (gross ton)	\$52.17	\$49.50	\$46.17	\$32.00
Nonferrous				
Aluminum ingot	24.40	24.40	24.40	22.20
Copper, electrolytic	43.00	43.00	43.00	30.00
Lead, St. Louis	15.30	15.30	15.30	14.80
Magnesium	33.25	33.25	33.25	27.75
Nickel, electrolytic	64.50	64.50	64.50	67.67
Tin, Straits, N. Y.	109.50	103.75	96.875	89.375
Zinc, E. St. Louis	13.00	13.00	13.00	11.50

STEEL PRODUCT MARKETS

Rail Demand Tightens Plate

Carbuilders get 20 pct increase in allotment . . . Other plate and structural users will bear brunt . . . Can expect further reduction in quotas . . . Extras continue to climb.

◆ INDICATIONS are that railroad carbuilders will get enough steel to build about 5500 cars a month in first quarter '56. This spells out about a 20 pct increase in their steel allotments.

It also spells out some sobering facts for the majority of other mill consumers already plagued by extended carryovers.

On the one hand, it means that major producers of plate and other products going into freight cars will develop further carryovers in first and second quarter.

On the other hand, it means that customers who've already been given a first quarter allotment—prior to the mills' decision to up the railroad ante—can expect a reduction in their allotment.

Detroit Steel Co. has boosted its sheet extras from \$2 to \$4 a ton. The extras apply to special quality sheets such as aluminum killed.

Packaging extras jumped \$2 a ton on the average. Size extras were increased from \$1 to \$3 a ton for hot-rolled sheets, 14 gage or lighter.

Price of standard ferromanganese (74 to 76 pct Mn) has been increased $\frac{3}{4}$ ¢ per pound by E. J. Lavino & Co. New price is 10.75¢ per pound f.o.b. Sheridan, Pa. Advance is attributed to increased cost of foreign ore and higher shipping rates. Company officials said this is the first price hike for the standard ferromanganese since 1952. Silvery iron prices have been increased by Keokuk Electro Metals Co. and Pittsburgh Metallurgical Co.

SHEET AND STRIP . . . There's a note of optimism among many producers that they'll be current on hot-rolled, cold-rolled, and galvanized sheet deliveries by March. This seems in di-

rect contrast to reality. Chicago says that hot- and cold-rolled sheet carryovers are running 60 to 90 days. Cold-rolled strip is booked through the first half of '56 on an allotment basis. In the East deliveries are still running behind an average of six weeks. Demand for just about everything continues unabated in Detroit. And Pittsburgh reports consumer inventories of hot-rolled sheets are virtually non-existent. Many customers now have to use cold-rolled sheets in place of hot-rolled where they can. Some Cleveland producers still hope they may become current on sheet and strip deliveries by January.

BARS . . . In Cleveland some consumers are substituting cold-finished bars for hot-rolled, since cold-finished are on shorter delivery date. Result: cold-finished backlog are growing. Right now, deliveries run about 3 to 4 weeks. Regular carbon bar customers are pressing the mills for off-heat lots or short ends. Pittsburgh bar deliveries and those in the East are running at least 6 weeks late. Some Pittsburgh mills are booked on orders through the next 6 months. Thirty to 60 day carryovers are still the rule in Chicago. Cold-finished deliveries run anywhere from 30 days to some time in second quarters. The carbon bar market is still strong in

Detroit. Little letup is expected until June. Alloy bar demand is up, indicating that normal carbon bar users are switching demands to get more steel.

PLATE . . . Some Pittsburgh consumers look to the possibility of being blanketed out for two months during the first quarter. One month is already wiped out by all major area plate producers, with one mill thinking along the same lines for March. The first signs of a plate gray market are beginning to show up in Detroit. Some brokers are offering light plate at higher prices than the prevailing level. A large Eastern producer is taking plate orders on a month-to-month basis for first quarter, is working on scheduling of February orders, since January is nearly filled.

STRUCTURALS . . . Pittsburgh mills' structural carryovers going into 1956 will just about fill the entire first quarter. Order backlogs extend far beyond the second quarter. Expected increase in production capacity won't help out much before 1957. Wide-flange beam demand is especially heavy in Detroit. Present carryovers are substantially long enough to keep production high well into third quarter.

PIPE AND TUBING . . . A big Cleveland producer of large diameter welded pipe is reportedly sold out into first quarter '57. Reason is that increased pipeline activity has been nationwide, eats up tonnages in big bites of around 20,000 tons or more per order. On small electric and butt-weld pipe, deliveries are only about three to four weeks behind and the backlog runs only into January. Pittsburgh mills simply don't have enough production facilities to handle the heavy demand for oil country goods. Welded pipe, on the other hand, is available for first quarter delivery. The continuing shortage of plate is expected to have a serious effect on linepipe production well into next year.

WAREHOUSE . . . Virtually every market area reports that warehouse business volume has consumers lining up for steel. Warehousemen in Pittsburgh say current demand is outstripping the heavy-pressure days of the Korean War. In Detroit, warehouses are watching inventories on all major products closely. They don't want to run out of stock completely. In Chicago, some customers are buying warehouse plate stock for shipment as far west as the Rockies.

Purchasing Agent's Checklist:

LABOR: Skilled worker shortage is a serious problem . . . p. 55

PRODUCTION: Use of salt bath quench is gaining ground . . . p. 58

RAW MATERIALS: Tin market looks unpredictable again . . . p. 60

MACHINE TOOLS: Foreign trade worries the industry . . . p. 83

TECHNICAL: Punched cards control parts scheduling . . . p. 95

*Revised.

December 15, 1955

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Comparison of Prices

(Effective Dec. 13, 1955)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in Italics.

	Dec. 14 1955	Dec. 7 1955	Nov. 15 1955	Dec. 14 1954
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Flat-Rolled Steel: (per pound)

Hot-rolled sheets	4.325¢	4.325¢	4.325¢	4.06¢
Cold-rolled sheets	5.325	5.325	5.325	4.95
Galvanized sheets (10 ga.)	5.85	5.85	5.85	5.45
Hot-rolled strip	4.325	4.325	4.325	4.06
Cold-rolled strip	6.29	6.29	6.29	5.79
Plate	4.52	4.52	4.52	4.325
Plates, wrought iron	10.40	10.40	9.30	9.30
Stain'l's C-B strip (No. 302)	44.50	44.50	44.50	42.00

Tin and Terneplate: (per base box)

Tinplate (1.50 lb.) cokes	\$9.05	\$9.05	\$9.05	\$9.05
Tinplate, electro (0.50 lb.)	7.75	7.75	7.75	7.75

Special coated mfg. terne

7.85	7.85	7.85	7.85
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Bars and Shapes: (per pound)

Merchant bars	4.65¢	4.65¢	4.65¢	4.30¢
Cold finished bars	5.90	5.90	5.90	5.40
Alloy bars	5.65	5.65	5.65	5.075
Structural shapes	4.60	4.60	4.60	4.25
Stainless bars (No. 302)	38.25	38.25	38.25	35.50
Wrought iron bars	11.50	11.50	10.40	10.40

Wire: (per pound)

Bright wire	6.25¢	6.25¢	6.25¢	5.75¢
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Rails: (per 100 lb.)

Heavy rails	\$4.725	\$4.725	\$4.725	\$4.45
Light rails	5.65	5.65	5.65	5.35

Semi-finish Steel: (per net ton)

Rerolling billets	\$65.50	\$65.50	\$65.50	\$64.00
Slabs, rerolling	65.50	65.50	65.50	64.00
Forging billets	84.50	84.50	84.50	78.00
Alloy blooms, billets, slabs	96.00	96.00	96.00	86.00

Wire Rod and Skelp: (per pound)

Wire rods	5.025¢	5.025¢	5.025¢	4.675¢
Skelp	4.225	4.225	4.225	3.90

Finished Steel Composite: (per pound)

Base price	5.174¢	5.174¢	5.174¢	4.797¢
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Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

←To identify producers, see Key on P. 164→

STAINLESS STEEL**Base price cents per lb. f.o.b. mill**

Producing Point	Basic	Fdry.	Mail.	Bas.	Low Phos.	Product	301	302	303	304	316	321	348	410	416	438
Bethlehem R3	60.50	61.00	61.50	62.00		Ingots, rerolling	17.75	19.00	—	20.25	31.50	25.00	33.75	15.00	—	15.25
Birdsboro, Pa. R6	60.50	61.00	61.50	62.00		Slabs, billets, rerolling	22.25	24.75	26.75	26.00	40.25	32.00	43.00	19.50	—	19.75
Birmingham R3	54.50	55.00*				Forg. discs, die blocks, rings	—	—	—	—	—	—	—	—	—	—
Birmingham W9	54.50	55.00*	59.00			Barrels, forgings	31.75	32.00	34.75	33.75	51.25	38.25	51.00	25.50	26.00	26.00
Birmingham U4	54.50	55.00*	59.00			Bars, wires, structures	38.00	38.25	41.00	40.25	60.75	45.25	60.00	30.50	31.00	31.00
Buffalo R3	58.50	59.00	59.50			Plates	40.00	40.25	42.75	43.00	64.00	49.25	64.75	31.75	32.25	32.25
Buffalo HI	58.50	59.00	59.50			Sheets	44.25	44.50	—	47.25	68.25	54.25	73.50	36.25	—	36.75
Buffalo W6	58.50	59.00	59.50	60.00		Strip, hot-rolled	32.00	34.50	—	37.25	58.25	44.25	50.75	—	—	—
Chester C7	60.50	61.00	61.50			Strip, cold-rolled	41.00	44.50	—	47.25	68.25	54.25	73.50	36.25	—	36.75
Chicago J4	58.50	59.00	59.50	59.50												
Cleveland A5	58.50	59.00	59.50	59.50												
Cleveland R3	58.50	59.00	59.50	59.50												
Duluth I4	58.50	59.00	59.50	59.50												
Erie I4	58.50	59.00	59.50	59.50												
Everett M6	62.50	63.00														
Fantana K1	64.50	65.00														
Geneva, Utah C7	58.50	59.00														
Granite City G2	60.40	60.90	61.40													
Hudson V1																
Lake Star L3																
Minneapolis P6	60.50	61.00	61.50													
Menominee P6	58.50															
Metairie Is. P4	58.50	59.00	59.50													
N. Tonawanda T1	58.50	59.00	59.50													
Pittsburgh U1	58.50	59.00	59.50													
Sharpville S1	58.50	59.00	59.50													
Se. Chicago R3	58.50	59.00	59.50													
Stearns B3	60.50	61.00	61.50	62.00	64.50											
Swedesboro A2	60.50	61.00	61.50	62.00												
Toledo I4	58.50	59.00	59.50	59.50												
Troy, N. Y. R3	60.50	61.00	61.50	62.00	64.50											
Youngstown Y1																

DIFFERENTIALS: Add .50¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phosph., 1.75 to 2.00 pct) .50¢ per ton for each 0.50 pct manganese or portion thereof over 1 pct, \$2 per ton for 0.5 to 0.75 pct nickel, \$1 for each additional .025 pct nickel. *Add \$1.00 for 0.31-0.49 pct phosph.

Silvery Iron: Buffalo, H1, 58.75; Jackson, J1, G1, 58.50. Add \$1.00 per ton for each 0.50 pct silicon over base (.6 to 0.65 pct) up to 17 pct. Add 75¢ for each 0.50 pct manganese over 1.0 pct. Bessemer ferrosilicon prices are \$1 over comparable silvery iron.

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., CII; Brackenridge, Pa., A3; Butler, Pa., A7; McKeesport, Pa., UI; Washington, Pa., W2, J3; Baltimore, E1; Middletown, O., A7; Massillon, O., R3; Gary, U1; Bridgeville, Pa., U2; New Castle, Ind., J2; Ft. Wayne, J4; Philadelphia, D1; Pittsburgh, U1.

Strip: Midland, Pa., CII; Cleveland, A5; Carnegie, Pa., S9; McKeesport, Pa., F1; Reading, Pa., C2; Washington, Pa., W2; J1; Leechburg, Pa., U2; Bridgeville, Pa., U2; Dunkirk, N. Y., A3; Massillon, O., R3; Chicago, U1; Syracuse, N. Y., CII; Watervliet, N. Y., A3; Waukegan, A5; Canton, O., T3; Ft. Wayne, H1; Philadelphia, D1; Detroit, A3.

Wire: Waukegan, A5; Massillon, O., R3; McKeesport, Pa., F1; Ft. Wayne, J4; Harrison, N. J., D3; Baltimore, A7; Dunkirk, A3; Monessen, P1; Syracuse, CII; Bridgeville, U2.

Structures: Baltimore, A7; Massillon, O., R3; Chicago, Ill., J4; Watervliet, N. Y., A3; Syracuse, CII.

Plates: Brackenridge, Pa., U1; Munhall, Pa., U1; Midland, Pa., CII; New Castle, Ind., J2; Middletown, A7; Washington, Pa., J2; Cleveland, Massillon, R3; Coatesville, Pa., CII; Philadelphia, D1.

Forged discs, die blocks, rings: Pittsburgh, CII; Syracuse, CII; Ferndale, Mich., A3; Washington, Pa., J2.

Forgings billets: Midland, Pa., CII; Baltimore, A7; Washington, Pa., J2; McKeesport, F1; Massillon, Canton, O., R3; Watervliet, A3; Pittsburgh, Chicago, U1; Syracuse, CII; Detroit, R3.

IRON AND STEEL SCRAP MARKETS

Composite Goes Over \$50

All major centers report gains . . . Mills fail to stem advance in Chicago . . . Pressure at broker level pushes Pittsburgh prices up . . . East continues strong.

♦ SCRAP prices continue to rise. THE IRON AGE Composite moved over the \$50-mark this week, advancing \$2.67 to \$52.17.

Mill efforts to contain the booming market have so far had little effect. In Chicago, offers to buy at slightly reduced figures and refusals to bid at higher prices could not block an advance of \$2 for the best steelmaking grades.

Eastern prices moved up \$2. Ohio centers reported prices inching up. Buffalo and Detroit markets were firm after last week's advances. The West Coast market continues strong and steady.

Every advance now sets a new record. And nowhere is there any evidence of weakness.

What makes the market look particularly strong at this time is pressure export stands ready to exert. In Birmingham, for instance, domestic consumers are buying openhearth scrap at previously established prices. At the same time, however, export buyers are moving into the market and threatening to cut into the mills' supply. This quick reaction has been felt in the East and other regions whenever the mills eased off in their buying or pricing.

Pittsburgh . . . Broker bidding is pushing scrap prices higher as quiet, off-the-record deals make themselves felt. Premium grades of scrap continued in strongest demand with low phos. sales reported at \$58. RR scrap prices advanced on the basis of latest sales and RR lists. No. 1 RR heavy melting and RR specialty sales brought \$56 and \$60 a ton respectively. Other grades are firm and unchanged.

Chicago . . . In a belated burst of psychological warfare last week, Chicago district consumers attempted to hold or break the strong advance in scrap market prices. Repeated offers to buy at slightly reduced prices, as

well as refusals to buy at higher prices, failed to halt the advance of scrap prices in the district. Sparked by railroad sales that were speedily followed by new mill sales prices \$1 to \$3 higher, the market moved up without a hitch. Adding to the tight outlook for the turn of the year, dealers have been moving out scrap at present prices in heavy tonnage. Stocks are sinking more rapidly than they are being replaced, with a consequent heavy drain on industrial scrap supplies.

Philadelphia . . . Reflecting continued strong consumer demand in this and adjacent districts, prices of steelmaking grades moved up \$2. Similar advances were also reported in clean cast chemical borings and unstripped motor blocks. Other grades are holding for the moment at earlier levels, although brokers and dealers indicate they are very strong at these quotations. No letup in export trade is reported and indications are this will continue strong in the weeks ahead.

New York . . . Scrap demand continues extremely heavy in this district. Domestic mills are pressing hard for scrap. Brokers are working feverishly to make deliveries, although so far they have been able to cover commitments. Prices continue their upward march, with all grades affected. Turnings are showing considerable strength, and cast prices have risen in view of the short supply situation.

Detroit . . . The scrap market in Detroit remains extremely strong, although no new orders have been placed. The current high prices are forcing dealers to be extra cautious. Most are trying to sell ahead so as not to get hurt financially if and when the market breaks.

Cleveland . . . A Cleveland mill came into the market last week with an order for primary grades and No. 2 bundles from three restricted dealer

yards at \$2.50 over previous week's quotations. Youngstown price rose in sympathy with two mills on fringes of area paying \$55 for production scrap. Brokers are being caught in between on covering old orders and newer higher prices, while dealers who have held out are getting better price. Newer prices, however, are not bringing out more scrap, so scramble will continue with cold weather cutting collections and processing in dealer yards. Railroad sales in Cleveland area brought \$54 and \$55 last week for No. 1 railroad heavy melting.

Birmingham . . . Feature of the scrap market in this district is the continued strength of the export market and steadily rising prices. Domestic consumers are continuing to buy at previously established prices for openhearth grades, but the field of supply appears to be shrinking as more and more dealers find it more advantageous to sell for export. Export prices, however, vary from port to port at South Atlantic and Gulf Coast ports. Some brokers think domestic mills will be forced to pay more than present prices for tonnage. The cast market continues strong. Turnings and some railroad items advanced this week.

St. Louis . . . Demand for scrap continues to exceed the supply, which resulted in increases in prices for most items on the list. Railroad lists were small, causing keener competition and higher prices. Competition from the Chicago market, as well as from all types of local consumers, also was a factor in advancing prices.

Cincinnati . . . Foundry business caught fire last week with some low phos. going for \$58 delivered and increases of from \$2 to \$5 in some grades. Higher railroad sales triggered the rise. One area mill is buying large tonnage of turnings on springboard rumored up to \$5 a ton from Indiana and Michigan.

Buffalo . . . Market here continues strong. All prices held firm except No. 2 bundles, which jumped \$4 to \$37.

Boston . . . Market continues firm here. All grades registered scattered gains with Pittsburgh and eastern Pennsylvania mills doing the buying. Export is strong but subject to change.

West Coast . . . Exporting tempo is picking up. Mills are making their melt with no trouble but are finding it tough to add anything to stockpiles. Prices are holding steady.

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The 50-pound tuyeres are palletized right in the kiln. They are stacked 42 to a pallet, and bound with two loops of $\frac{1}{4}$ " x .035" USS Gerrard Flat Steel Strapping.

A fork lift truck drives right into the kiln, picks up the pallet and takes it to the railroad car or to the warehouse. No manual handling is necessary.

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• Loading and moving the tuyeres by hand used to require 8 hours to fill a normal freight car with 2200 units. Using the Gerrard system, it now takes only 2 hours—a savings of 75% in man-hours alone!

The tuyeres are used exclusively in the Bessemer Furnace. When fitted together in the furnace, they form a series of continuous holes through which highly compressed air is forced into the molten steel for the

purpose of blowing out impurities. Climax Company produces 60% of the nation's tuyere requirements.

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UNITED STATES STEEL

Scrap Prices

(Effective Dec. 18, 1955)

Pittsburgh

No. 1 hvy. melting	\$52.00 to \$54.00
No. 2 hvy. melting	47.00 to 48.00
No. 1 bundles	52.00 to 54.00
No. 2 bundles	43.00 to 44.00
Machine shop turn	31.00 to 32.00
Mixed bor. and ms. turn	31.00 to 32.00
Shoveling turnings	35.00 to 36.00
Cast iron borings	35.00 to 36.00
Low phos. punch'gs plate	57.00 to 58.00
Heavy turnings	44.00 to 45.00
No. 1 RR. hvy. melting	55.00 to 56.00
Scrap rails, random lgth.	61.00 to 62.00
Rails 2 ft and under	67.00 to 68.00
RR. steel wheels	59.00 to 60.00
RR. spring steel	59.00 to 60.00
RR. couplers and knuckles	59.00 to 60.00
No. 1 machinery cast	55.00 to 55.00
Cupola cast	46.00 to 47.00
Heavy breakable cast	44.00 to 45.00

Chicago

No. 1 hvy. melting	\$51.00 to \$52.00
No. 2 hvy. melting	42.00 to 42.00
No. 1 factory bundles	55.00 to 56.00
No. 1 dealers' bundles	52.00 to 52.00
No. 2 dealers' bundles	41.00 to 42.00
Machine shop turn	31.00 to 32.00
Mixed bor. and turn.	33.00 to 34.00
Shoveling turnings	32.00 to 34.00
Cast iron borings	33.00 to 34.00
Low phos. forge crops	60.00 to 61.00
Low phos. punch'gs plate	57.00 to 58.00
Low phos. 3 ft and under	56.00 to 57.00
No. 1 RR. hvy. melting	55.00 to 56.00
Scrap rails, random lgth.	65.00 to 66.00
Rerolling rails	74.00 to 75.00
Rails 2 ft and under	70.00 to 71.00
Locomotive tires, cut	58.00 to 59.00
Cut bolsters & side frames	59.00 to 60.00
Angles and splice bars	66.00 to 67.00
RR. steel car axles	66.00 to 67.00
RR. couplers and knuckles	59.00 to 60.00
No. 1 machinery cast	56.00 to 57.00
Cupola cast	52.00 to 53.00
Heavy breakable cast	44.00 to 45.00
Cast iron brake shoes	41.00 to 42.00
Cast iron car wheels	50.00 to 51.00
Malleable	62.00 to 64.00
Stove plate	43.00 to 44.00

Philadelphia Area

No. 1 hvy. melting	\$51.00 to \$52.00
No. 2 hvy. melting	47.00 to 48.00
No. 1 bundles	51.00 to 52.00
No. 2 bundles	42.00 to 44.00
Machine shop turn	34.00 to 35.00
Mixed bor. short turn.	34.00 to 35.00
Cast iron borings	34.00 to 35.00
Shoveling turnings	37.00 to 38.00
Clean cast chem. borings	37.00 to 38.00
Low phos. 5 ft and under	52.00 to 53.00
Low phos. 2 ft and under	53.00 to 54.00
Low phos. punch'gs	53.00 to 54.00
Elec. furnace bundles	51.00 to 52.00
Heavy turnings	45.00 to 46.00
RR. steel wheels	54.00 to 55.00
RR. spring steel	54.00 to 55.00
Rails 18 in. and under	62.00 to 64.00
Cupola cast	49.50 to 50.50
Heavy breakable cast	51.00 to 52.00
Cast iron car wheels	56.00 to 56.00
Malleable	61.50 to 62.50
Unstripped motor blocks	38.00 to 39.00
No. 1 machinery cast	56.00 to 57.00

Cleveland

No. 1 hvy. melting	\$51.00 to \$52.00
No. 2 hvy. melting	41.50 to 42.50
No. 1 bundles	51.00 to 52.00
No. 2 bundles	40.00 to 42.00
No. 1 busheling	51.00 to 52.00
Machine shop turn	26.00 to 27.00
Mixed bor. and turn.	30.00 to 31.00
Shoveling turnings	30.00 to 31.00
Cast iron borings	30.00 to 31.00
Cut struct'r'l & plates, 2 ft & under	54.00 to 55.00
Drop forge flashings	49.50 to 50.50
Low phos. punch'gs plate	51.00 to 52.00
Foundry steel, 3 ft & under	50.00 to 51.00
No. 1 RR. heavy melting	54.00 to 55.00
Rails 2 ft and under	66.00 to 67.00
Rails 18 in. and under	67.00 to 68.00
Railroad grade bars	40.00 to 41.00
Steel axle turnings	34.00 to 35.00
Railroad cast.	54.00 to 55.00
No. 1 machinery cast	51.00 to 52.00
Stove plate	49.00 to 50.00
Malleable	55.00 to 56.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Youngstown

No. 1 hvy. melting	\$52.50 to \$54.50
No. 2 hvy. melting	43.00 to 45.00
No. 1 bundles	53.50 to 54.50
No. 2 bundles	42.50 to 44.50
Machine shop turn.	29.00 to 30.00
Shoveling turnings	33.00 to 34.00
Cast iron borings	33.00 to 34.00
Low phos. plate	54.50 to 55.50

Buffalo

No. 1 hvy. melting	\$43.00 to \$44.00
No. 2 hvy. melting	39.00 to 40.00
No. 1 busheling	43.00 to 44.00
No. 1 bundles	43.00 to 44.00
No. 2 bundles	36.00 to 37.00
Machine shop turn.	27.00 to 28.00
Mixed bor. and turn.	28.00 to 29.00
Shoveling turnings	29.00 to 30.00
Cast iron borings	29.00 to 30.00
Low phos. plate	46.00 to 47.00
Scrap rails, random lgth.	47.00 to 48.00
Rails 2 ft and under	54.00 to 55.00
RR. steel wheels	48.00 to 49.00
RR. springs steel	43.00 to 49.00
RR. couplers and knuckles	48.00 to 49.00
No. 1 machinery cast	45.00 to 46.00
No. 1 cupola cast	42.00 to 43.00

Detroit

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$45.00 to \$46.00
No. 2 hvy. melting	39.00 to 40.00
No. 1 bundles	45.00 to 46.00
No. 2 bundles	37.00 to 38.00
Machine shop turn.	30.00 to 31.00
Mixed bor. and turn.	28.00 to 29.00
Shoveling turnings	33.00 to 34.00
Cast iron borings	28.00 to 29.00
Low phos. 18 in. & under	55.00 to 56.00
Rails, random lengths	60.00 to 61.00
Rails, 18 in. and under	67.00 to 68.00
No. 1 cupola cast.	46.00 to 47.00
Heavy, breakable cast.	44.00 to 45.00
Drop broken cast.	54.50 to 55.50

St. Louis

No. 1 hvy. melting	\$41.50 to \$42.50
No. 2 hvy. melting	39.00 to 40.00
No. 1 bundles	45.00 to 46.00
No. 2 bundles	31.00 to 32.00
New busheling	45.00 to 46.00
Drop forge flashings	44.50 to 45.00
Machine shop turn.	21.00 to 22.00
Mixed bor. and turn.	24.00 to 25.00
Shoveling turnings	24.00 to 25.00
Cast iron borings	24.00 to 25.00
Low phos. punch'gs. plate	45.00 to 46.00
No. 1 cupola cast.	42.00 to 43.00
Heavy breakable cast.	36.00 to 37.00
Stove plate	37.00 to 38.00
Automotive cast	45.00 to 46.00

Boston

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$39.00 to \$40.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 bundles	39.00 to 40.00
No. 2 bundles	31.00 to 32.00
Machine shop turn.	18.00
Shoveling turnings	21.00
Cast iron borings	18.00
No. 1 RR. hvy. melting	39.00
No. 1 cupola cast	50.00

New York

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$46.00 to \$47.00
No. 2 hvy. melting	42.00 to 43.00
No. 1 bundles	37.00 to 38.00
Machine shop turn.	25.00 to 26.00
Mixed bor. and turn.	26.00 to 27.00
Shoveling turnings	27.00 to 28.00
Clean cast chem. borings	31.00 to 32.00
No. 1 machinery cast	46.00 to 47.00
Mixed yard cast	44.00 to 45.00
Charging box cast	45.00 to 46.00
Heavy breakable cast	45.00 to 46.00
Unstripped motor blocks	29.00 to 30.00

Birmingham

No. 1 hvy. melting	\$42.00 to \$43.00
No. 2 hvy. melting	38.00 to 39.00
No. 1 bundles	42.00 to 43.00
No. 2 bundles	30.00 to 31.00
No. 1 busheling	42.00 to 43.00
Machine shop turn.	29.00 to 30.00
Shoveling turnings	30.00 to 31.00
Cast iron borings	30.00 to 31.00
Low phos. plate	45.00 to 46.00
Rerolling rails	63.00 to 64.00
No. 1 cupola cast	47.50 to 48.50
Stove plate	44.50 to 45.50
Charging box cast	30.00 to 31.00
Cast iron car wheels	38.00 to 39.00
Unstripped motor blocks	38.00 to 39.00
Mashed tin cans	15.00 to 16.00

Cincinnati

No. 1 hvy. melting	\$45.00 to \$46.00
No. 2 hvy. melting	39.00 to 40.00
No. 1 bundles	45.00 to 46.00
No. 2 bundles	37.00 to 38.00
Machine shop turn.	30.00 to 31.00
Mixed bor. and turn.	28.00 to 29.00
Shoveling turnings	33.00 to 34.00
Cast iron borings	28.00 to 29.00
Low phos. 18 in. & under	55.00 to 56.00
Rails, random lengths	60.00 to 61.00
Rails, 18 in. and under	67.00 to 68.00
No. 1 cupola cast	46.00 to 47.00
Heavy, breakable cast.	44.00 to 45.00
Drop broken cast.	54.50 to 55.50

San Francisco

No. 1 hvy. melting	\$39.00
No. 2 hvy. melting	37.00
No. 1 bundles	39.00
No. 2 bundles	31.00
Machine shop turn.	18.00
Cast iron borings	18.00
No. 1 RR. hvy. melting	39.00
No. 1 cupola cast	50.00

Los Angeles

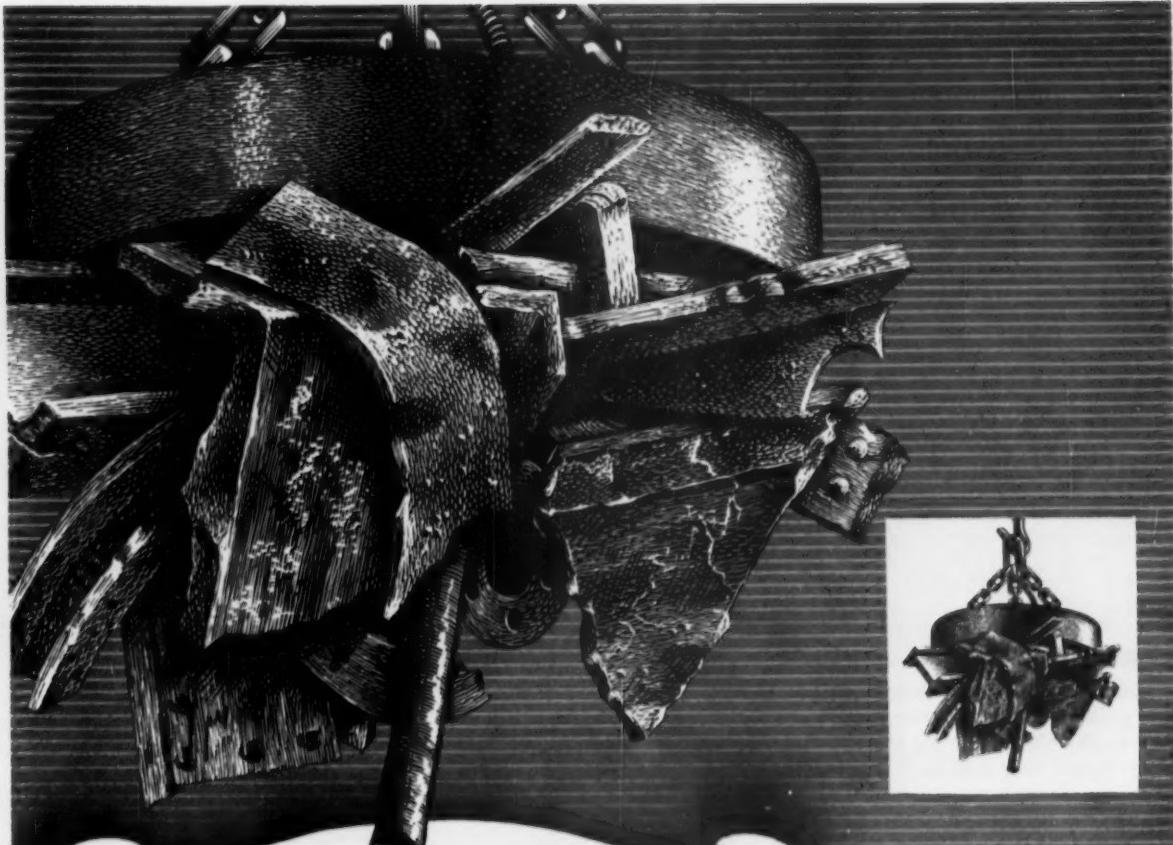
No. 1 hvy. melting	\$39.00
No. 2 hvy. melting	37.00
No. 1 bundles	39.00
No. 2 bundles	33.00
No. 3 bundles	33.00
Machine shop turn.	18.00
Shoveling turnings	21.00
Cast iron borings	18.00
Elec. furn. 1 ft and under	39.00
No. 1 RR. hvy. melting	39.00
No. 1 cupola cast	48.00

Seattle

No. 1 hvy. melting	\$42.00
No. 2 hvy. melting	38.00
No. 1 bundles	34.00
No. 2 bundles	30.00
No. 3 bundles	30.00
Machine shop turn.	21.00
Mixed yard cast	40.00

Hamilton, Ont.

No. 1 hvy. melting	\$43.50
No. 2 hvy. melting	39.50
No. 1 bundles	43.50
No. 2 bundles	36.00
Mixed steel scrap	32.



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Copper Prediction for 1956

Consensus of industry opinion indicates expected production in 1956 near 3 million tons . . . Government eases stockpile requirements for nickel, copper.

• THE WORD on what to expect in copper in 1956 is that barring strikes or other unforeseen occurrences, world refining of copper will approach, or even surpass, 3 million tons.

The expected production of refined copper for this year is 2.7 million tons. This total could have come close to or exceeded 3 million tons were it not for strikes and unforeseen developments.

Predictions for 1956 might well be projected to the coming decade. It actually highlights the big difficulty copper seems to be having—occurrences which slow or halt production in mines in all parts of the copper producing world at some time during the year.

It has reached the point where strikes can not be considered unforeseen. The three major copper producers, U. S., Chile and Rhodesia, all were hit by shutdowns in 1955.

Producers are geared to refine 3 million tons of copper in a year. But they probably will not do so in 1956. They will when they are able to solve the strike problem and operate at or near capacity for a year.

The Government acted this week to ease the pinch on both nickel and copper consumers. During first quarter 1956, a total of 4.1 million lb of nickel per month will be di-

verted from shipments to the Government and will be made available instead to nickel users. As has been the case in November and December, 1955, a portion of this tonnage will be premium price ferronickel and nickel ingot.

Copper consumers will be slightly better off to the extent of about 14,000 tons during the first quarter. In a second postponement, the Office of Defense Mobilization authorized the "forgiving" of all copper deliveries to the Government during the first quarter.

All nickel and copper deliveries are to be from scheduled deliveries. None is to be released from the Government stockpiles.

TIN . . . There are indications that the New York market seems to be settling down. The sudden shortage of spot tin sent the price spiralling from 96¢ to as high as \$1.09 in less than a month. With increased shipments from producing countries, the price seems to be leveling off at \$1.08 and may even fall a bit. But it won't fall far and it won't stay down for long. One of the major smelters in Malaya usually makes it a practice to close down in December for a general cleanup and stocktaking. Considering the fact that there are only about five major smelters in the world, and one of these produces strictly for government stockpile (Texas City, Texas), the closing down of one unit can have a marked effect on the supply. A closedown in De-

ember will take effect in London and New York in January. Thus you can expect to pay about the current price for a month at least before relief can be considered.

TUNGSTEN . . . The General Service Administration's policy of paying premium prices in order to spur domestic production has just about failed with respect to tungsten, according to a report from Robert Bradford, GSA regional director.

An unnamed organization cost the government millions by purchasing tungsten mined in Mexico for \$10, smuggling it across the border, mixing it with domestic and selling it to the government for \$63.

Complete facts have been turned over to the Justice Dept.

A representative of the Tungsten Institute indicated knowledge of the case but said that from initial and incomplete reports he didn't think sizeable amounts of ore were involved. This makes latest tungsten figures of the Dept. of the Interior concerning tungsten inaccurate. However, the third quarter domestic production of 3.9 million lb of tungsten fell below the second quarter output of 4.03 million lb. However, this is still well above the quarterly average of the last half decade. Shipments continued to exceed production, building up a bigger backlog of orders. Indications are that production and supply are starting to level off with a good possibility of a more stable market in the near future.

MAGNESIUM . . . Year end statement from the Magnesium Assn. calls 1955 "most satisfying" despite the fact that it was not a record either volumewise or dollarwise. The basis for the statement is that the association feels that great strides have been made in educating fire-conscious industry on the advantages of magnesium when properly handled. Ingots production will be down, about 13 pct. But wrought production is up, almost 50 pct over 1954. It will pass 10,000 tons for the first time in the history of the industry. Cast output will be up 10 pct. General outlook for 1956 is bright, according to the association.

EXPORT . . . Foreign Trade Div. of National Association of Waste Material Dealers, Inc. has taken strong exception to the proposal by the Copper And Brass Research Assn. that export quotas for copper scrap and copper-base alloy scrap be reduced. The official rebuttal said exports are negligible now.

Daily Nonferrous Metal Prices

(Cents per lb except as noted)

	Dec. 7	Dec. 8	Dec. 9	Dec. 10	Dec. 12	Dec. 13
Copper, electro, Conn.	43.00	43.00	43.00	—	43.00	43.00
Copper, Lake, delivered	43.00	43.00	43.00	—	43.00	43.00
Tin, Straits, New York	104.375	105.625	109.25	109.00	109.00	109.50*
Zinc, East St. Louis	13.00	13.00	13.00	13.00	13.00	13.00
Lead, St. Louis	15.30	15.30	15.30	15.30	15.30	15.30

Note: Quotations are going prices

*Tentative



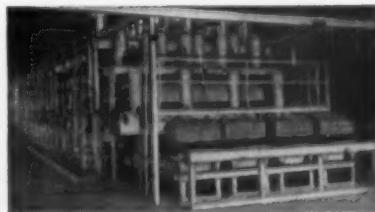
How to Select the Most Economical Insulating Firebrick

The advantages of lightweight insulating firebrick over ordinary "heavy-weight" firebrick are generally known to furnace operators and furnace builders. But many buyers have wondered just what advantages there might be in one brand of insulating firebrick as against another. The answer to this question could very well mean savings in fuel costs, increased furnace output, longer life . . . or all three.

One furnace builder ran tests on their small electric kilns where heat input could be measured with great accuracy. Here's what they found: B&W IFB required 25% less heat than any other brand of insulating firebrick they tried.

The reason? B&W IFB are lighter in weight than any other insulating firebrick—they contain more tiny, insulating air cells. Heavier, denser insulating firebrick linings waste fuel two ways: They soak up and store more heat which is lost when the furnace is cooled; and they conduct more heat through the walls.

How about long life? One of the

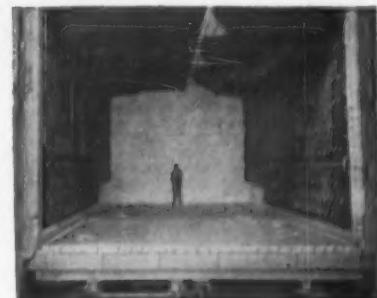


toughest tests of firebrick is in the lining of a carbon monoxide furnace. Some brands last only a few weeks, then disintegrate, due to iron oxide impurities in the brick which react with the gas.

But B&W Insulating Firebrick contain little iron oxide, and they're processed at high temperatures so that any traces of iron oxide form stable compounds. So instead of deteriorating they stay on the job year after year—in many cases over 10 years.

Another factor, important to many furnace operators, is accurate temperature control. Here again B&W IFB have an advantage over other insulating firebrick. First, because B&W IFB are lighter in weight they store and conduct less heat—and they respond more quickly to changes in heat input.

A typical example is the giant stress-relieving furnace shown below—sixty feet by twenty-two feet by seventeen feet high. The B&W lining plays a vital part in holding the desired temperature within 5 degrees accuracy!



Next time you buy or specify insulating firebrick, remember that the lightest weight brick of all—B&W—has the highest insulation value, the longest life and the greatest furnace heat controllability.

THE BABCOCK & WILCOX CO.
Refractories Division
General Offices:
161 East 42nd St., New York 17, N. Y.
Works: Augusta, Ga.

Nonferrous Prices (Effective Dec. 13, 1955)

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

Aluminum

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate ("F" temper except 6061-0)

Alloy	.032	.061	.136- .249	.250- .8
1100, 3003....	40.8	36.7	37.5	36.5
5052....	48.8	43.4	41.7	39.9
5051-0....	46.4	41.3	39.4	39.8

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
8-8....	41.6-43.3	56.6-60.2
13-14....	42.3-43.7	57.5-61.5
24-26....	45.3-45.7	67.7-72.1
38-38....	53.6-54.3	90.5-94.3

Screw Machine Stock—2011-T-3

Size"	34	56-56	54-1	134-134
Price	54.5	53.4	52.1	50.1

Roofing Sheet, Corrugated

(Per sheet, 26" wide, base, 16,000 lb)

Length" →	72	96	120	144
.019 gage....	\$1.295	\$1.727	\$2.160	\$2.590
.024 gage....	1.615	2.162	2.692	3.232

Magnesium

(F.o.b. mill, freight allowed)

Sheet & Plate: F81-O $\frac{1}{4}$ in., 61¢; $\frac{1}{8}$ in., 62¢; $\frac{1}{16}$ in., 63¢; $\frac{1}{32}$ in., 64¢; $\frac{1}{64}$ in., 65¢; 0.032 in., 66¢. Specification grade higher. Base, 20,000 lb.

Extruded Round Rod: F8, diam $\frac{1}{4}$ to 0.31 in., 62.6¢; $\frac{1}{2}$ to $\frac{3}{4}$ in., 65¢; $\frac{1}{4}$ to 1.749 in., 60.5¢; $\frac{1}{2}$ to $\frac{3}{4}$ in., 67¢. Other alloys higher. Base up to $\frac{1}{4}$ in., 10,000 lb.; $\frac{1}{2}$ to $\frac{3}{4}$ in., 20,000 lb.; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes: Rectangles: F8, In weight per ft for perimeters less than size indicated: 0.10 to 0.11 lb, 5.5 in., 70.7¢; 0.22 to 0.35 lb, 6.8 in., 66.9¢; 0.30 to 0.59 lb, 8.6 in., 69¢; 1.8 to 2.9 lb, 19.4 in., 50.8¢; 4 to 6 lb, 26 in., 57.7¢. Other alloys higher. Base, In weight per ft of shape: Up to $\frac{1}{4}$ in., 10,000 lb.; 1.80 lb, 20,000 lb.; 1.80 lb and heavier, 30,000 lb.

Extruded Round Tubing: F8, 0.049 to 0.057 in. wall thickness: OD $\frac{1}{4}$ to $\frac{1}{8}$ in., \$1.925; $\frac{1}{8}$ to $\frac{1}{2}$ in., \$1.475; $\frac{1}{2}$ to $\frac{3}{4}$ in., \$1.106; 1 to 2 in., 92.6¢; 1.05 to 0.219 in. wall: OD $\frac{1}{4}$ to $\frac{1}{2}$ in., 75.6¢; 1 to 2 in., 71.5¢; 2 to 4 in., 70.5¢. Other alloys higher. Base OD: Up to $\frac{1}{4}$ in., 10,000 lb.; $\frac{1}{2}$ to 2 in., 20,000 lb.; over $\frac{1}{2}$ in., 30,000 lb.

Copper, Brass, Bronze

(Freight included on 500 lb)

	Sheet	Rods	Shapes
Copper.....	68.13	69.11	68.48
Copper, h-r....	68.76	69.31	68.48
Copper, drawn....	60.36	60.36	60.36
Low brass....	56.58	56.49	56.49
Yellow brass....	52.27	52.21	52.21
Red brass....	58.09	58.02	58.02
Naval brass....	52.83	49.94	48.40
Leaded brass....	50.18	50.12	48.42
Com. bronze....	59.39	53.38	54.94
Mang. bronze....	59.39	53.38	54.94
Phos. bronze....	81.00	81.50	81.50
Muntz metal....	53.74	49.65	50.80
NI silver, 10 pct....	66.00	68.23	70.68
Beryllium copper, CR, 1.9% Be, Base 2000 lb, f.o.b.			
Strip.....			\$1.84
Rod, bar, wire.....			1.81

Nickel, Monel, Inconel

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR....	102	83	99
Strip, CR....	102	92	126
Rod, Bar, HR....	87	74	98
Angles, HR....	87	74	98
Plate, HR....	97	87	96
Seamless Tube....	123	110	153
Shot, Blocks....		71	...

Titanium

(10,000 lb base, f.o.b. mill)

Sheet and strip, commercially pure, \$18.10-\$18.60; alloy \$15.25-\$15.75; Plate, HR, commercially pure, \$10.50-\$11.00; alloy, \$11.60-\$12.00. Wire, rolled and/or drawn, commercially pure, \$9.50-\$11.50; alloy, \$11.80; Bar, HR or forged, commercially pure, \$7.90-\$8.15; alloy, \$7.90-\$8.10.

PRIMARY METAL

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99.4%, 10,000 lb, freight allowed	24.40
Aluminum pig	22.50
Antimony, American, Laredo, Tex.	33.50
Beryllium copper, per lb conta'd Be \$43.00	
Beryllium aluminum 5% Be, Dollars per lb contained Be	\$72.75
Bismuth, ton lots	82.25
Cadmium, dol'd	51.70
Cobalt, 97.99% (per lb)	\$2.60 to \$2.67
Copper, electro, Conn. Valley	43.00
Copper, Lake, delivered	43.00
Gold, U. S. Treas., per troy oz.	\$35.00
Indium, 99.9% dollars per troy oz.	\$2.25
Iridium, dollars per troy oz.	\$100 to \$120
Lead, St. Louis	15.30
Magnesium, 99.8+%, f.o.b. Freeport, Tex., 10,000 lb, pig	32.50
Mixed old cast	20 — 21 1/2
Mixed new clips	22 — 23
Mixed turnings, dry	20 1/2 — 22

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	39	38 1/2
Yellow brass	28 1/2	26 1/2
Red brass	34 1/2	33 1/2
Comm. bronze	35 1/2	35
Mang. bronze	37	35 1/2
Yellow brass rod ends	28 1/2	25 1/2

Custom Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	42
No. 2 copper wire	40 1/2
Light copper	38 1/2
No. 1 composition	35
No. 1 comp. turnings	34
Hvy. yellow brass solids	23 1/2
Brass pipe	28 1/2
Radiators	27

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	42
No. 2 copper wire	40 1/2
Light copper	38 1/2
No. 1 composition	35
No. 1 composition turnings	34
Unlined red car boxes	24 — 24 1/2
Cocks and faucets	24 1/2 — 25
Clean heavy yellow brass	20 — 20 1/2
Brass pipe	25 1/2 — 26
New soft brass clippings	25 1/2 — 26
No. 1 brass rod turnings	23 1/2 — 24

Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire	39 — 39 1/2
No. 2 heavy copper and wire	38 — 38 1/2
Light copper	35 1/2 — 36
New type shell cuttings	35 — 35 1/2
Auto radiators (unsweated)	24 — 24 1/2
No. 1 composition	31 1/2 — 32
No. 1 composition turnings	29 1/2 — 30

Aluminum

Alum. pistons and struts	17 — 17 1/2
Aluminum crankcases	16 1/2 — 17
1100 (28) aluminum clippings	20 1/2
Old sheet and utensils	16 1/2 — 17
Borings and turnings	11 1/2 — 12
Industrial castings	16 1/2 — 17 1/2
2024 (24s) clippings	18 1/2 — 19

Zinc

New zinc clippings	8 — 8 1/2
Old zinc	5 1/2 — 6
Zinc routings	4
Old die cast scrap	3 1/2

Nickel and Monel

Pure nickel clippings	\$1.25
Clean nickel turnings	\$1.00
Nickel anodes	\$1.25
Nickel rod ends	\$1.25
New Monel clippings	\$4 1/2
Clean Monel turnings	44
Old sheet Monel	50
Nickel silver clippings, mixed	23
Nickel silver turnings, mixed	19

Lead

Soft scrap lead	12 — 12 1/2
Battery plates (dry)	6 1/2 — 6 1/2
Batteries, acid free	4

Magnesium

Segregated solids	18 1/2 — 19
Castings	17 1/2 — 18

Miscellaneous

Block tin	81 — 82
No. 1 pewter	64 — 65
Auto babbitt	43 — 44
Mixed common babbitt	15
Solder joints	20 — 20 1/2
Siphon tops	47
Small foundry type	16 1/2
Monotype	15
Lino and stereotype	14 — 14 1/2
Electrotype	12 — 12 1/2
Hand picked type shells	10 1/2 — 11
Lino. and stereo. dress	8
Electro. dress	8

IRON AGE STEEL PRICES <i>(Effective Dec. 13, 1955)</i>	<i>Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.</i>												
	BILLETS, BLOOMS, SLABS			PIL- ING	SHAPES STRUCTURALS			STRIP					
	Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide- Flange	Hat- rolled	Cold- rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot- rolled	Alloy Cold- rolled
Bethlehem, Pa.					<i>396.00 R3</i>		<i>4.65 B3</i>	<i>6.80 B3</i>	<i>4.65 B3</i>				
Buffalo, N. Y.	<i>\$68.50 B3</i>	<i>\$84.50 R3, B3</i>	<i>\$96.00 R3, B3</i>	<i>5.45 B3</i>	<i>4.65 B3</i>	<i>6.80 B3</i>	<i>4.65 B3</i>	<i>4.325 R3,B3</i>	<i>6.25 B3 6.25 R7,S10,</i>	<i>6.425 B3</i>	<i>9.10 B3</i>		
Claymont, Del.													
Harrison, N. J.													<i>13.45 C11</i>
Conshohocken, Pa.													
New Bedford, Mass.													
Johnstown, Pa.	<i>\$68.50 B3</i>	<i>\$84.50 B3</i>	<i>\$96.00 B3</i>		<i>4.65 B3</i>	<i>6.80 B3</i>							
Boston, Mass.										<i>6.80 T8</i>			
New Haven, Conn.										<i>6.70 D1 A5</i>			
Phoenixville, Pa.							<i>5.15 P2</i>	<i>5.15 P2</i>					
Sparrows Pt., Md.										<i>4.325 B3</i>	<i>6.25 B3</i>	<i>6.425 B3</i>	<i>9.10 B3</i>
Bridgeport, Wallingford, Conn.	<i>\$73.50 N8</i>	<i>\$89.50 N8</i>								<i>4.625 N8</i>	<i>6.70 W1</i>		<i>7.50 N8</i>
Pawtucket, R. I. Worcester, Mass.											<i>6.80 N7 A5</i>		
Alton, Ill.										<i>4.50 L1</i>			
Ashland, Ky.										<i>4.325 A7</i>			
Canton-Massillon, Dover, Ohio		<i>\$86.50 R3</i>	<i>\$96.00 R3</i>										<i>13.45 G4</i>
Chicago, Ill.	<i>\$68.50 U1</i>	<i>\$84.50 R3, U1,W8</i>	<i>\$96.00 R3, U1,W8</i>	<i>5.45 U1</i>	<i>4.60 U1, W8</i>	<i>6.75 U1, Y1</i>	<i>4.60 U1</i>	<i>4.55 A1 4.325 N4,W8</i>	<i>6.35 A1,T8</i>				<i>7.20 W8</i>
Cleveland, Ohio										<i>6.25 A5,J3</i>		<i>9.30 A5</i>	
Detroit, Mich.			<i>\$96.00 R5</i>							<i>4.425 G3,M2</i>	<i>6.35 D1,D2, G3,M2,P11</i>	<i>6.525 G3</i>	<i>9.20 D2, G3</i>
Duluth, Minn.													
Gary, Ind. Harbor, Indiana	<i>\$68.50 U1</i>	<i>\$84.50 U1</i>	<i>\$96.00 U1, Y1</i>	<i>5.45 I3</i>	<i>4.60 U1, I3</i>	<i>6.75 U1, I3</i>			<i>4.325 I3, U1,Y1</i>	<i>6.35 I3 6.25 Y1</i>	<i>6.425 I3, U1,Y1</i>	<i>9.30 Y1</i>	<i>7.20 Y1, U1</i>
Sterling, Ill.										<i>4.425 N8</i>			
Indianapolis, Ind.										<i>6.40 C5</i>			
Newport, Ky.													<i>7.30 NS</i>
Middletown, Ohio										<i>6.45 A7</i>			
Niles, Warren, Ohio Sharon, Pa.	<i>\$68.50 C10</i>	<i>\$84.50 C10</i>	<i>\$96.00 C10</i>							<i>4.325 S1, R3</i>	<i>6.25 S1, R3,T3</i>	<i>6.425 S1, R3</i>	<i>9.10 S1, R3</i>
Pittsburgh, Pa. Midland, Pa. Butler, Pa.	<i>\$68.50 U1, J3</i>	<i>\$84.50 J3, U1,C11</i>	<i>\$96.00 U1, C11</i>	<i>5.45 U1</i>	<i>4.60 U1, J3</i>	<i>6.75 U1, J3</i>	<i>4.60 U1</i>	<i>4.325 P6</i>	<i>6.25 S7,B4</i>				<i>7.20 S9</i>
Portsmouth, Ohio										<i>4.325 P7</i>	<i>6.25 P7</i>		
Weirton, Wheeling, Follansbee, W. Va.						<i>4.60 W3</i>			<i>4.325 W3</i>	<i>6.25 F3,W3</i>	<i>6.425 W3</i>	<i>9.10 W3</i>	
Youngstown, Ohio						<i>4.60 Y1, C10</i>			<i>4.325 U1, Y1</i>	<i>6.25 Y1,C5</i>	<i>6.425 U1, Y1</i>	<i>9.30 Y1</i>	<i>7.20 U1, Y1</i>
Fountain, Cal.	<i>\$76.00 K1</i>	<i>\$92.00 K1</i>	<i>\$115.00 K1</i>			<i>5.25 K1</i>	<i>7.40 K1</i>	<i>5.40 K1</i>	<i>5.975 K1</i>	<i>8.00 K1</i>	<i>7.525 K1</i>		<i>8.85 K1</i>
Geneva, Utah		<i>\$84.50 C7</i>				<i>4.60 C7</i>	<i>6.75 C7</i>						
Kansas City, Mo.						<i>4.70 S2</i>	<i>6.85 S2</i>				<i>6.675 S2</i>		<i>7.45 S2</i>
Los Angeles, Torrance, Cal.		<i>\$94.00 B2</i>	<i>\$116.00 B2</i>			<i>5.30 C7, B2</i>	<i>7.45 B2</i>		<i>5.975 C7, B2</i>	<i>8.30 C7</i>			<i>8.40 B2</i>
Minneapolis, Calif.						<i>4.90 C6</i>				<i>5.425 C6</i>			
Portland, Ore.						<i>5.35 O2</i>							
San Francisco, Niles, Pittsburg, Cal.		<i>\$94.00 B2</i>				<i>5.25 B2, P9</i>	<i>7.40 B2</i>		<i>5.975 B2, C7</i>				
Seattle, Wash.		<i>\$98.00 B2</i>				<i>5.35 B2</i>	<i>7.50 B2</i>		<i>5.325 B2</i>				
Atlanta, Ga.									<i>4.925 A8</i>				
Fairfield, Ala., City, Birmingham, Ala.	<i>\$68.50 T2</i>	<i>\$84.50 T2</i>				<i>5.10 C16, 4.40 R3,T2</i>	<i>6.75 T2</i>		<i>4.325 R3,T2 4.825 C16</i>		<i>6.425 T2</i>		
Houston, Lone Star, Tex.	<i>\$74.50 L3</i>	<i>\$89.50 S2</i>	<i>\$101.00 S2</i>			<i>4.70 S2</i>	<i>6.85 S2</i>				<i>6.675 S2</i>		<i>7.45 S2</i>

IRON AGE		Prices identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.												
STEEL PRICES <i>(Effective Dec. 13, 1955)</i>		SHEETS								WIRE ROD	TINPLATE†	BLACK PLATE		
		Hot-rolled 16 ga. & heavier	Cold-rolled	Galvanized 16 ga.	Enameling 12 ga.	Long Terne 16 ga.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot-rolled 16 ga.		Cokes* 1.25-lb. base box	Electro* 0.25-lb. base box	Holloware Enameling 25 ga.
EAST	Bethlehem, Pa.													
	Buffalo, N. Y.	4.325 B3	5.325 B3				6.375 B3	7.875 B3			W6			
	Clementon, Del.													
	Coatesville, Pa.													
	Cocheshechoken, Pa.	4.375 A2	5.375 A2				6.425 A2							
	Harrisburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.										5.825 B3			
	Fairless, Pa.	4.375 U1	5.375 U1				6.425 U1	7.925 U1				\$9.30 U1	\$8.00 U1	
	New Haven, Conn.													
	Phoenixville, Pa.													
	Sparrows Pt., Md.	4.325 B3	5.325 B3	5.85 B3			6.375 B3	7.875 B3	8.00 B3		5.125 B3	\$9.30 B3	\$8.00 B3	
	Worcester, Mass.										5.325 A3			
	Trenton, N. J.													
MIDDLE WEST	Alton, Ill.										5.20 L1			
	Ashland, Ky.	4.325 A7		5.85 A7	5.90 A7									
	Canton-Massillon, Dover, Ohio			5.85 R1, R3										
	Chicago, Joliet, Ill.	4.55 A7 4.325 W8					6.375 U1				5.825 A3, N4, R3			
	Sterling, Ill.										5.125 N4			
	Cleveland, Ohio	4.325 J3, R3	5.325 J3, R3		5.90 R3		6.375 J3, R3	7.875 J3, R3			5.825 A3			
	Detroit, Mich.	4.425 G3, M2	5.425 G3 5.325 M2				6.475 G3	7.975 G3						
	Newport, Ky.	4.325 N5	5.325 N5	5.85 N5										
	Gary, Ind. Harbor, Indiana	4.325 J3, U1, Y1	5.325 J3, U1, Y1	5.85 U1, Y1	5.90 U1, Y1	6.25 U1	6.375 Y1, U1, Y1	7.875 U1, Y1			5.025 Y1	\$9.20 J3, U1, Y1	\$7.90 J3, U1, Y1	
	Grain City, Ill.	4.325 G2	5.315 G2	5.85 G2	6.10 G2									
	Kokomo, Ind.	4.425 C9		5.95 C9							5.475 C9	5.125 C9		
	Manfield, Ohio	4.325 E2	5.325 E2			6.25 E2				E2				
	Middletown, Ohio	5.315 A7	5.85 A7	5.90 A7	6.25 A7									
	Niles, Warren, Ohio Sharon, Pa.	4.325 S1, R3, N3	5.325 R1, N3	5.85 R3 5.85 N3	5.90 N3	6.25 N3	6.375 S1, R3	7.875 R3				\$9.30 R3	\$7.90 R3	
WEST	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	4.325 J3, U1, P6	5.325 J3, U1, P6	5.85 U1	5.90 U1, A7		6.375 J3, U1	7.875 U1	8.00 U1		5.825 A5, P6	\$9.20 J3, U1	\$7.90 J3, U1	
	Portsmouth, Ohio	4.325 P7	5.325 P7								5.825 P7			
	Weirton, Wheeling, Follansbee, W. Va.	4.325 W3, W5	5.325 W3, W5, F3			6.25 W3, W5	6.375 W3	7.875 W3				\$9.20 W3, W5	\$7.90 W3, W5	
	Youngstown, Ohio	4.325 U1, Y1	5.325 Y1		5.90 Y1		6.375 U1, Y1	7.875 Y1			5.825 Y1			
	Fontana, Cal.	5.075 K1	6.425 K1				7.125 K1	8.975 K1						
	Geneva, Utah	4.425 C7												
	Kansas City, Mo.											5.275 S2		
SOUTH	Los Angeles, Torrance, Cal.											5.825 B2		
	Minneapolis, Colo.											5.275 C6		
	San Francisco, Niles, Pittsburg, Cal.	5.025 C7	6.275 C7	6.60 C7							5.875 C7	\$9.95 C7	\$8.65 C7	
	Seattle, Wash.													
	Atlanta, Ga.													
SOUTH	Fairfield, Ala. Alabama City, Ala.	4.325 R3, T2	5.325 T2	5.85 R3, T2			6.375 T2			5.625 R3, T2	5.025 R3, T2	\$9.30 T2	\$8.00 T2	
	Houston, Tex.										5.275 S3			

IRON AGE STEEL PRICES <i>(Effective Dec. 18, 1955)</i>		Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.									
		BARS					PLATES			WIRE	
		Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy
											Mfr's. Bright
EAST	Bethlehem, Pa.				5.575 R3	7.425 R3	6.80 R3				
	Buffalo, N. Y.	4.65 R3, R5	4.65 R3, R5	5.95 R5	5.575 R3, R5	7.425 R3, R5	6.80 R3	4.50 R3, R5			6.25 W6
	Clayton, Del.							4.80 C4	6.30 C4	6.725 C4	
	Coatesville, Pa.							4.80 L4	6.30 L4	6.725 L4	
	Conshohocken, Pa.							4.80 A7	5.575 A7	6.725 A7	
	Harrisburg, Pa.							5.10 P2	5.575 C3		
	Hartford, Conn.			6.40 R3		7.725 R3					
	Johnstown, Pa.	4.65 R3	4.65 R3		5.575 R3		6.80 R3	4.50 R3		6.30 R3	6.725 R3
	Fairless, Pa.	4.80 UI	4.80 UI		5.725 UI						
	Newark, N. J.				6.35 W10		7.60 W10				
	Camden, N. J.				6.35 P10						
	Bridgeport, Putnam, Conn.	4.80 N8		6.45 W10	5.725 N8			4.750 N8			
	Sparrows Pt., Md.		4.65 R3					4.50 R3		6.30 R3	6.725 R3
	Palmer, Worcester, Readville, Mass.			6.35 W11	6.45 B5, C14		7.725 A5, B5	4.50 R3			6.55 A5, W6
	Spring City, Pa.			6.35 K4		7.60 K4					
	Alton, Ill.	4.85 L7									6.425 L7
	Ashland, Newport, Ky.							4.50 A7, N5	6.30 N5		
	Canton-Massillon, Mansfield, Ohio	4.75 R3		5.90 R2, R3	5.575 R3, T5	7.425 R2, R3, T5		4.50 E2			
MIDDLE WEST	Chicago, Joliet, Ill.	4.65 UI, N4, W6, R3, P13	4.65 N4, R3, P13	5.90 A5, W10, W8, B5, L2	5.575 UI, R3, W8	7.425 A5, W8, W10, L2, B5		4.50 UI, W8, I3, A1, R3	5.575 UI	6.30 UI	6.725 UI, N4, W7
	Cleveland, Ohio	4.65 R3	4.65 R3	5.90 A5, C13		7.425 A5, C13	6.80 R3	4.80 J3, R3	5.575 J3		6.725 R3, J3
	Detroit, Mich.	4.75 G3	4.75 G3	5.90 R5, 6.10 B5, P8, 6.15 P3	5.575 R5	7.425 R5, 7.825 B5, P3	6.90 G3	4.80 G3			6.825 G3
	Duluth, Minn.										6.25 A5
	Gary, Ind. Harbor, Crawfordsville	4.65 J3, UI, Y1	4.65 J3, UI, Y1	5.90 M5, R3	5.575 J3, UI, Y1	7.425 M5, R3	6.80 UI, J3, Y1	4.50 J3, UI, Y1	5.575 J3	6.30 UI, Y1	6.725 UI, J3, Y1
	Granite City, Ill.							4.70 G2			
	Kokomo, Ind.										6.35 C9
	Sterling, Ill.	4.75 N4	4.75 N4								6.35 N4
	Niles, Warren, Ohio Sharon, Pa.	4.85 R3, C10		5.90 C10	5.575 C10	7.425 C10	6.80 R3	4.50 S1, R3		6.30 S1	6.725 S1
	Pittsburgh, Pa. Midland, Pa.	4.65 J3, UI, C11	4.65 J3, UI	5.90 A5, C8, C11, J3, W10, B4, R3	5.575 UI, C11	7.425 A5, C11, W10, C8, R3	6.80 J3, UI	4.50 J3, UI	5.575 UI	6.30 UI	6.725 J3, UI
	Portsmouth, Ohio										6.25 P7
	Weirton, Wheeling, Follansbee, W. Va.	4.85 W3						4.50 W3, W3			
	Youngstown, Ohio	4.65 UI, Y1, C10, R3	4.65 UI, Y1, R3	5.90 Y1, UI, C10	5.575 UI, Y1, C10	7.425 Y1, C10	6.80 UI, Y1	4.50 UI, Y1, R3		6.30 Y1	6.725 Y1
	Emeryville, Cal.	5.40 J3	5.40 J5								
	Fontana, Cal.	5.35 K1	5.35 K1		6.825 K1		7.50 K1	5.15 K1		6.95 K1	7.375 K1
	Geneva, Utah							4.50 C7			6.725 C7
	Kansas City, Mo.	4.90 S2	4.90 S2		5.825 S2		7.85 S2				6.50 S2
	Los Angeles, Torrance, Cal.	5.35 B2, C7	5.35 B2, C7	7.35 R3	6.825 B2		7.50 R3			7.425 B2	7.20 B2
	Minneapolis, Colo.	5.10 C6	5.10 C6					5.35 C8			6.50 C6
	Portland, Ore.	5.40 O2	5.40 O2								
	San Francisco, Niles, Pittsburg, Cal.	5.35 C7	5.35 C7	5.40 B2, P9				7.55 B2			7.20 C7
	Seattle, Wash.	5.40 B2, P12, N6	5.40 B2, P12					7.55 B2	5.40 B2	7.30 B2	7.425 B2
SOUTH	Atlanta, Ga.	4.85 A8	4.85 A8								6.45 A8
	Fairfield, Ala. City, Birmingham, Ala.	4.65 T2, R3	4.65 T2, R3	5.15 C16			6.80 T2	4.50 T2, R3		6.725 T2	6.25 R3, T2
	Houston, Ft. Worth, Lone Star, Tex.	4.90 S2	4.90 S2		6.825 S2		7.65 S2	4.85 L3	4.60 S2	6.825 S2	6.50 S2

Steel Prices (Effective Dec. 11, 1955)

Key to Steel Producers

With Principal Offices

A1	Acme Steel Co., Chicago
A2	Alan Wood Steel Co., Connellsville, Pa.
A3	Allegheny Ludlum Steel Corp., Pittsburgh
A4	American Cast Metals Co., Carnegie, Pa.
A5	American Steel & Wire Div., Cleveland
A6	Angell Nail & Chapel Co., Cleveland
A7	Armenia Steel Corp., Middletown, O.
A8	Atlantic Steel Co., Atlanta, Ga.
B1	Baldock & Wilson Tube Div., Beaver Falls, Pa.
B2	Bethlehem Pacific Coast Steel Corp., San Francisco
B3	Bethlehem Steel Co., Bethlehem, Pa.
B4	Blair Strip Steel Co., New Castle, Pa.
B5	Bliss & Laughlin, Inc., Harvey, Ill.
B6	Brock Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.
C1	Calstrip Steel Corp., Los Angeles
C2	Carpenter Steel Co., Reading, Pa.
C3	Central Iron & Steel Co., Harrisburg, Pa.
C4	Claymont Products Dept., Claymont, Del.
C5	Cold Metal Products Co., Youngstown, O.
C6	Colorado Fuel & Iron Corp., Denver
C7	Columbia-Geneva Steel Div., San Francisco
C8	Columbia Steel & Shaping Co., Pittsburgh
C9	Continental Steel Corp., Kokomo, Ind.
C10	Copperweld Steel Co., Pittsburgh, Pa.
C11	Crucible Steel Co. of America, Pittsburgh
C12	Cumberland Steel Co., Cumberland, Md.
C13	Cuyahoga Steel & Wire Co., Cleveland
C14	Compressed Steel Shaping Co., Radenville, Mass.
C15	G. O. Carlson, Inc., Indianapolis, Pa.
C16	Connor Steel Div., Birmingham
C17	Chester Blast Furnace Inc., Chester, Pa.
D1	Detroit Steel Corp., Detroit
D2	Detroit Tube & Steel Div., Detroit
D3	Driver Harris Co., Harrison, N. J.
D4	Dickson Weatherproof Nail Co., Evanston, Ill.
D5	Henry Dillston & Sons, Inc., Philadelphia
E1	Eastern Stainless Steel Corp., Baltimore
E2	Empire Steel Co., Mansfield, O.
F1	Firth Sterling, Inc., McKeesport, Pa.
F2	Fitzsimmons Steel Corp., Youngstown
F3	Follansbee Steel Corp., Follansbee, W. Va.
G1	Globe Iron Co., Jackson, O.

G2	Granite City Steel Co., Granite City, Ill.
G3	Great Lakes Steel Corp., Detroit
G4	Green Steel Co., Dover, O.
H1	Hanna Furnaces Corp., Detroit
H2	Ingersoll Steel Div., Chicago
H3	Inland Steel Co., Chicago
H4	Interlake Iron Corp., Cleveland
J1	Jackson Iron & Steel Co., Jackson, O.
J2	Jessep Steel Corp., Washington, Pa.
J3	Jones & Laughlin Steel Corp., Pittsburgh
J4	Jodlyn Mfg. & Supply Co., Chicago
J5	Judson Steel Corp., Enverry, Calif.
K1	Kaiser Steel Corp., Fontana, Cal.
K2	Keystone Steel & Wire Co., Peoria
K3	Koppers Co., Granite City, Ill.
K4	Keystone Drawn Steel Co., Spring City, Pa.
L1	Laclede Steel Co., St. Louis
L2	LaSalle Steel Co., Chicago
L3	Lake Star Steel Co., Dallas
L4	Lukens Steel Co., Coatesville, Pa.
M1	Mahoning Valley Steel Co., Niles, O.
M2	McLaughlin Steel Corp., Detroit
M3	Messer Tube & Mfg. Co., Sharon, Pa.
M4	Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5	Monarch Steel Div., Hammond, Ind.
M6	Mystic Iron Works, Everett, Mass.
N1	National Supply Co., Pittsburgh
N2	National Tube Div., Pittsburgh
N3	Niles Rolling Mill Div., Niles, O.
N4	Northwestern Steel & Wire Co., Sterling, Ill.
N5	Newport Steel Corp., Newport, Ky.
N6	Northwest Steel Rolling Mills, Seattle
N7	Newman Crosby Steel Co., Pawtucket, R. I.
N8	Northeastern Steel Corp., Bridgeport, Conn.
O1	Oliver Iron & Steel Co., Pittsburgh
O2	Oregon Steel Mills, Portland
P1	Pago Steel & Wire Div., Monaca, Pa.
P2	Phoenix Iron & Steel Co., Phoenixville, Pa.
P3	Pilgrim Drawn Steel Div., Plymouth, Mich.
P4	Pittsburgh Coke & Chemical Co., Pittsburgh
P5	Pittsburgh Screw & Bolt Co., Pittsburgh
P6	Pittsburgh Steel Co., Pittsburgh
P7	Plymouth Div., Detroit Steel Corp., Detroit
P8	Plymouth Steel Co., Detroit
P9	Pacific States Steel Co., Niles, Cal.
P10	Precision Drawn Steel Co., Camden, N. J.
P11	Production Steel Strip Corp., Detroit
P12	Pacific Steel Rolling Mills, Seattle
P13	Phoenix Mfg. Co., Joliet, Ill.
R1	Roeves Steel & Mfg. Co., Dover, O.
R2	Reliance Div., Eaton Mfg. Co., Massillon, O.
R3	Republic Steel Corp., Cleveland
R4	Rohrbach Sams Co., John A., Trenton, N. J.
R5	Rotary Electric Steel Co., Detroit
R6	Rodney Metals, Inc., New Bedford, Mass.
R7	Rome Strip Steel Co., Rome, N. Y.
S1	Sharon Steel Corp., Sharon, Pa.
S2	Sheffield Steel Corp., Kansas City
S3	Shenango Furnace Co., Pittsburgh
S4	Simonds Saw & Steel Co., Fitchburg, Mass.
S5	Sweet's Steel Co., Williamsport, Pa.
S6	Standard Forging Corp., Chicago
S7	Stanley Works, New Britain, Conn.
S8	Superior Drawn Steel Co., Monaca, Pa.
S9	Superior Steel Corp., Carnegie, Pa.
S10	Seneca Steel Service, Buffalo
T1	Towanda Iron Div., N. Towanda, N. Y.
T2	Tennessee Coal & Iron Div., Fairfield
T3	Tennessee Products & Chem. Corp., Nashville
T4	Thomas Strip Div., Warren, O.
T5	Timken Steel & Tube Div., Canton, O.
T6	Tremont Nail Co., Wachem, Mass.
T7	Texas Steel Co., Fort Worth
T8	Thompson Wire Co., Boston
U1	United States Steel Corp., Pittsburgh
U2	Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3	Ulbrich Stainless Steels, Wallingford, Conn.
U4	U. S. Pipe & Foundry Co., Birmingham
W1	Wallingford Steel Co., Wallingford, Conn.
W2	Washington Steel Corp., Washington, Pa.
W3	Weirton Steel Co., Weirton, W. Va.
W4	Wheatland Tube Co., Wheatland, Pa.
W5	Wheeling Steel Corp., Wheeling, W. Va.
W6	Wickwire Spencer Steel Div., Buffalo
W7	Wilson Steel & Wire Co., Chicago
W8	Wisconsin Steel Co., S. Chicago, Ill.
W9	Woodward Iron Co., Woodward, Ala.
W10	Wycoff Steel Co., Pittsburgh
W11	Worcester Pressed Steel Co., Worcester, Mass.
W12	Wallace Barnes Steel Div., Bristol, Conn.
V1	Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (per) f.o.b. mill. Base price about \$200 per net ton.

STANDARD T. & C.	BUTTWELD												SEAMLESS											
	1/2 in.		3/4 in.		1 in.		1 1/4 in.		1 1/2 in.		2 in.		2 1/2-3 in.		2 in.		2 1/2 in.		3 in.		3 1/2-4 in.			
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.		
Sparrows Pt. B3	15.50	8.75	18.50	4.25	21.00	7.75	23.50	8.50	24.00	9.50	24.50	10.50	18.00	26.00	9.75	16.75	16.50	16.25	16.50	16.25	16.50	16.25		
Youngstown R3	17.50	9.25	20.50	4.25	21.50	7.75	25.50	9.00	26.00	10.75	26.50	10.50	23.50	28.00	10.75	16.75	16.50	16.25	16.50	16.25	16.50	16.25		
Fontana K1	6.00	+9.25	20.50	+5.25	21.50	+7.75	25.50	+9.00	+1.00	14.50	+0.50	15.50	6.50	16.50	0.25	11.75	6.50	+8.50	10.50	+8.25	13.00	+3.75	14.50	+2.25
Pittsburgh J3	17.50	9.25	20.50	4.25	21.50	9.75	25.50	16.50	26.00	11.50	26.50	12.00	23.00	21.00	11.75	16.50	+8.50	10.50	+8.25	13.00	+3.75	14.50	+2.25	
Alton, Ill. J3	15.50	8.25	18.50	4.25	21.00	7.75	23.50	8.50	24.00	9.50	24.50	10.50	18.00	26.00	9.75	16.75	16.50	16.25	16.50	16.25	16.50	16.25		
Sharon M3	17.50	9.25	20.50	4.25	21.50	9.75	25.50	16.50	26.00	11.50	26.50	12.00	23.00	21.00	11.75	16.50	+8.50	10.50	+8.25	13.00	+3.75	14.50	+2.25	
Fairless N3	15.00	8.25	18.50	4.25	21.00	7.75	23.50	8.50	24.00	9.50	24.50	10.50	18.00	26.00	9.75	16.75	16.50	16.25	16.50	16.25	16.50	16.25		
Pittsburgh N1	17.50	9.25	20.50	4.25	21.50	9.75	25.50	16.50	26.00	11.50	26.50	12.00	23.00	21.00	11.75	16.50	+8.50	10.50	+8.25	13.00	+3.75	14.50	+2.25	
Wheeling W5	17.50	8.25	20.50	4.25	21.50	9.75	25.50	16.50	26.00	11.50	26.50	12.00	23.00	21.00	11.75	16.50	+8.50	10.50	+8.25	13.00	+3.75	14.50	+2.25	
Wheatland W4	17.50	8.25	20.50	4.25	21.50	9.75	25.50	16.50	26.00	11.50	26.50	12.00	23.00	21.00	11.75	16.50	+8.50	10.50	+8.25	13.00	+3.75	14.50	+2.25	
Youngstown Y1	17.50	8.25	20.50	4.25	21.50	9.75	25.50	16.50	26.00	11.50	26.50	12.00	23.00	21.00	11.75	16.50	+8.50	10.50	+8.25	13.00	+3.75	14.50	+2.25	
Indiana Harbor Y1	14.50	8.25	19.50	4.25	22.00	8.75	24.50	9.50	25.00	10.50	25.50	11.00	27.00	10.75	17.50	16.50	+8.50	10.50	+8.25	13.00	+3.75	14.50	+2.25	
Lorain N2	17.50	8.25	20.50	4.25	21.50	9.75	25.50	16.50	26.00	11.50	26.50	12.00	23.00	21.00	11.75	16.50	+8.50	10.50	+8.25	13.00	+3.75	14.50	+2.25	
EXTRA STRONG PLAIN ENDS																								
Sparrows Pt. B3	20.0	6.25	24.00	10.25	26.00	13.75	28.50	12.50	27.00	13.50	27.50	14.00	28.00	12.75	17.75	17.50	17.25	17.50	17.25	17.50	17.25	17.50	17.25	
Youngstown R3	22.0	6.25	26.00	10.25	28.00	13.75	28.50	13.00	29.00	14.00	29.50	14.50	30.00	13.75	17.75	17.50	17.25	17.50	17.25	17.50	17.25	17.50	17.25	
Fairless N2	20.0	6.25	24.00	10.25	26.00	13.75	28.50	12.50	27.00	13.50	27.50	14.00	28.00	12.75	17.75	17.50	17.25	17.50	17.25	17.50	17.25	17.50	17.25	
Fontana K1	19.50	6.25	24.00	10.25	26.00	13.75	28.50	12.50	27.00	13.50	27.50	14.00	28.00	12.75	17.75	17.50	17.25	17.50	17.25	17.50	17.25	17.50	17.25	
Pittsburgh J3	22.0	6.25	26.00	10.25	28.00	13.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75	18.00	+6.00	13.00	+2.75	15.50	+0.25	28.50	6.75		
Alton, Ill. J3	20.0	6.25	24.00	10.25	26.00	13.75	28.50	12.50	27.00	13.50	27.50	14.00	28.00	12.75	17.75	17.50	17.25	17.50	17.25	17.50	17.25	17.50	17.25	
Sharon M3	22.0	6.25	26.00	10.25	28.00	13.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75	18.00	+6.00	13.00	+2.75	15.50	+0.25	28.50	6.75		
Pittsburgh N1	22.0	6.25	26.00	10.25	28.00	13.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75	18.00	+6.00	13.00	+2.75	15.50	+0.25	28.50	6.75		
Wheeling W5	22.0	6.25	26.00	10.25	28.00	13.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75	18.00	+6.00	13.00	+2.75	15.50	+0.25	28.50	6.75		
Wheatland W4	22.0	6.25	26.00	10.25	28.00	13.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75	18.00	+6.00	13.00	+2.75	15.50	+0.25	28.50	6.75		
Youngstown Y1	22.0	6.25	26.00	10.25	28.00	13.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75	18.00	+6.00	13.00	+2.75	15.50	+0.25	28.50	6.75		
Indiana Harbor Y1	21.0	7.25	25.00	11.25	27.00	14.75	27.50	13.50	28.00	14.50	28.50	15.00	29.00	13.75	17.75	17.50	17.25	17.50	17.25	17.50	17.25	17.50	17.25	
Lorain N2	22.0	6.25	26.00	10.25	28.00	13.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75	18.00	+6.00	13.00	+2.75	15.50	+0.25	28.50	6.75		

Threads only, butt-weld and seamless 2 1/2 in. higher discount. Plain ends, butt-weld and seamless, 3-in. and under, 1/2 in. higher discount. Butt-weld jobbers discount, 5 pct. Galvanized discounts based on zinc price range of over \$6 to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: 1/2, 3/4 and 1-in., 2 pt.; 1 1/4, 1 1/2 and 2 in., 3 pt.; 2 1/2 in., 4 pt. Zinc price in range over 7¢ to 9¢ would lower discounts; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 12.00¢ per lb.

TOOL STEEL

F.o.b. mill	W	Cr	V	Mo	Co	per lb
18	4	1	—	—	—	\$1.60
18	4	1	—	—	—	2.305
18	4	2	—	—	—	1.765
1.5	4	1.5	8	—	—	.96
8	4	3	6	—	—	1.35
6	4	2	5	—	—	1.105
High-carbon chromium						.77
Oil hardened manganese						.43
Special carbon						.39
Extra carbon						.33
Regular carbon						.275
Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.						

CLAD STEEL

Base prices, cents per lb f.o.b.

Cladding	Plate (A3, J2, L6)			Sheet (J2)
	10 pct	15 pct	20 pct	25 pct
304.....	30.50	33.15	36.05	32.50
316.....	35.50	38.45	41.40	47.00
321.....	32.00	34.85	37.75	37.25
347.....	34.40	37.90	41.40	48.25
445.....	25.00	29.60	33.35	.....
410, 430.....	25.30	29.10	32.85	.....

CR Strip (SS) Copper, 10 pct, 2 sides, \$8.00; 1 side, \$8.00.

ELECTRICAL SHEETS

F.o.b. Mill Cents Per Lb	22-Gage	Hot-Rolled (Cut Length)*	Cold-Reduced (Coiled or Cut Length)	
			Semi- Processed	Fully Processed
Field.....	8.40	8.60	10.10	.....
Armature.....	9.35	9.60	10.70	.....
Elect.....	9.95	10.20	10.70	.....
Motor.....	10.95	11.20	11.70	.....
Dynamo.....	11.85	12.10	12.60	.....
Trans. 72.....	12.80	13.05	13.55	.....
Trans. 65.....	13.35	Grain Oriented		.....
Trans. 58.....	13.85	Trans. 80.....	17.45	.....
Trans. 52.....	14.85	Trans. 73.....	17.95	.....

Producing points: Bessemer (W5); Brackenridge (A5); Granite City (G2); Indiana Harbor (I3); Mansfield (E2); Newport, Ky. (N3); Niles, O. (N3); Vandergrift (U1); Warren, O. (R3); Zanesville (A7).

* Coils 75¢ higher.

LAKE SUPERIOR ORES

51.50% Fe; natural content, delivered lower Lake ports. Prices effective for 1955 season.

	Gross Ton
Oopenhearth lump	\$11.35
Old range, bessemer	10.40
Old range, nonbessemer	10.35
Messabi, bessemer	10.35
Messabi, nonbessemer	10.10
High phosphorus	10.00

Base price, f.o.b., dollars per 100 lb.

WARE-HOUSES

City	Delivery Charge	Sheets		Strip		Plates		Shapes		Bars		Alloy Bars			
		Hot-Rolled	Cold-Rolled	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled	Cold-Finished	Hot-Rolled As rolled	Cold-Finished	Hot-Rolled As rolled	Cold-Drawn As rolled	Hot-Rolled As rolled	Cold-Drawn As rolled	Hot-Rolled As rolled	Cold-Drawn As rolled
Baltimore.....	5.10	7.93	8.32	8.37	7.65	.....	7.21	7.93	7.61	8.62	14.38	13.45	13.36	16.29	16.49
Birmingham.....	.15	6.80	7.93	8.85	7.96	.....	6.99	7.28	7.68	9.35	.....	.....	.....	.....	.....
Boston.....	.10	7.70	8.81	10.27	7.94	10.30	7.89	8.13	7.83	9.53	12.15	13.40	16.65	16.50	.....
Buffalo.....	.30	6.80	7.90	9.70	7.15	.....	7.15	7.40	7.10	7.90	13.80	13.45	13.10	16.15	.....
Chicago.....	.25	6.80	8.09	8.50	7.96	.....	6.99	7.28	7.08	7.75	13.20	12.85	16.05	15.90	.....
Cincinnati.....	.25	6.92	8.33	8.90	7.30	.....	7.28	7.75	7.32	8.05	13.44	31.00	16.20	16.14	.....
Cleveland.....	.30	6.80	8.09	8.85	7.16	.....	7.16	7.81	7.14	7.85	12.91	.....	.....	15.90	.....
Denver.....	6.80	10.74	11.22	8.90	.....	8.60	8.75	8.90	9.82	.....	.....	.....	17.97	.....	.....
Detroit.....	.25	6.90	8.28	8.78	7.34	8.15	7.27	7.75	7.30	8.04	13.40	13.05	16.25	16.10	.....
Houston.....	7.85	8.75	10.49	8.15	.....	7.89	8.28	8.25	9.85	14.35	14.00	17.15	17.95	.....	.....
Kansas City.....	.20	7.47	8.76	9.17	7.73	.....	7.68	7.95	7.75	8.52	13.87	13.52	16.72	16.57	.....
Los Angeles.....	.10	8.65	10.00	11.00	8.35	.....	8.65	8.30	8.05	11.25	.....	14.25	.....	17.85	.....
Memphis.....	.10	7.12	8.25	.....	7.38	.....	7.31	7.60	7.40	9.15	.....	.....	.....	.....	.....
Milwaukee.....	.25	6.80	8.18	8.58	7.15	.....	7.00	7.45	7.17	7.94	.....	12.94	.....	15.90	.....
New Orleans.....	.15	7.20	8.35	.....	7.45	.....	7.48	7.70	7.50	9.55	.....	.....	.....	.....	.....
New York.....	.10	7.46	8.68	9.44	8.07	11.10	7.76	7.99	7.96	9.48	13.63	13.28	16.48	16.33	.....
Norfolk.....	.20	7.25	.....	7.65	.....	7.45	7.95	7.65	9.50	.....	.....	.....	.....	.....	.....
Philadelphia.....	.10	7.14	8.42	9.35	7.67	.....	7.37	7.74	7.64	8.65	13.38	13.16	16.36	16.21	.....
Pittsburgh.....	.25	6.80	8.09	9.20	7.16	9.68	6.99	7.28	7.68	7.85	13.20	12.85	16.65	15.90	.....
Portland.....	7.85	8.80	10.65	8.00	7.95	7.75	7.85	7.95	12.20	.....	15.00	.....	17.50	.....	.....
Salt Lake City.....	.20	10.60	.....	9.35	.....	9.20	9.15	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco.....	.10	8.10	9.65	10.15	8.35	.....	8.05	8.25	8.05	11.20*	.....	14.25	.....	17.85	.....
Seattle.....	.00	8.55	10.40	10.80	8.65	.....	8.20	8.30	8.35	11.70	.....	14.60	.....	17.65	.....
St. Louis.....	.25	7.00	8.38	9.19	7.35	.....	7.28	7.68	7.37	8.14	13.69	13.14	16.35	16.19	.....
St. Paul.....	.25	7.46	8.59	9.18	7.72	.....	7.65	7.94	7.74	8.51	.....	13.51	.....	16.31	.....

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1995 lb. All others: 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets for quantity.

Exceptions: (*) 1500 to 9999 lb. (**) 1000 lb or over. (*) \$3.25 delivery. (**) 1000 to 1999 lb, \$3.25 delivery.

* Plus analysis charge.

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails		Woven Wire Fence		Single Loop Barbless Ties		Galf. Barbed and Twisted Barbless Wire		March. Wire Amt'd		March. Wire Gain.	
	Cal	Col	Cal	Col	Cal	Col	Cal	Col	Cal	Col	Cal	Col
Alabama City R3.....	152	162	173	175	7.40	7.80	.....	.....	.....	.....	.....	.....
Aliquippa, Pa. J3.....	152	162	173	175	7.40	7.80	.....	.....	.....	.....	.....	.....
Atlanta A8.....	154	167	175	180	7.50	8.025	.....	.....	.....	.....	.....	.....
Bartonsville K2.....	154	168	175	181	7.50	8.075	.....	.....	.....	.....	.....	.....
Buffalo W6.....	154	167	173	179	7.40	7.80	.....	.....	.....	.....	.....	.....
Chicago Ill. R4**.....	152	166	173	179	7.40	7.80	.....	.....	.....	.....	.....	.....
Cleveland A6.....	157	167	173	179	7.40	7.80	.....	.....	.....	.....	.....	.....
Crawfordsville M4*.....	154	167	175	175	7.50	8.05	.....	.....	.....	.....	.....	.....
Donora, Pa. A5.....	152	162	173	175	7.40	7.80	.....	.....	.....	.....	.....	.....
Dublin A5.....	152	163	173	175	7.40	7.80	.....	.....	.....	.....	.....	.....
Fairfield, Ala. T2.....	152	163	173	175	7.40	7.80	.....	.....	.....	.....	.....	.....
Galveston D4.....	157	167	170	178	7.65	8.05	.....	.....	.....	.....	.....	.....
Houston S2.....	152	164	173	175	7.40	7.80	.....	.....	.....	.....	.....	.....
Johnstown, Pa. B3*.....	152	162	173	175	7.40	7.80	.....	.....	.....	.....	.....	.....
Joliet, Ill. A5.....	152	162	173	175	7.40	7.80	.....	.....	.....	.....	.....	.....
Kokomo, Ind. C9.....	154	154	175	177	7.50	7.90	.....	.....	.....	.....	.....	.....
Los Angeles B7.....	157	174	178	180	7.65	8.05	.....	.....	.....	.....	.....	.....
Minneapolis C6.....	157	167	178	180	7.65	8.05	.....	.....	.....	.....	.....	.....
Monessen P6.....	152	162	173	175	7.40	7.80	.....	.....	.....	.....	.....	.....
Moline, Ill. R3.....	152	162	173	175	7.40	7.80	.....	.....	.....	.....	.....	.....
Pittsburgh C7.....	171	185	195	205	8.35	8.75	.....	.....	.....	.....	.....	.....
Portsmouth P7.....	152	162	173	175	7.40	7.80	.....	.....	.....	.....	.....	.....
Ramsey, Pa. A5.....	152	162	173	175	7.40	7.80	.....	.....	.....	.....	.....	.....
San Francisco C6.....	154	167	180	181	7.50	8.075	.....	.....	.....	.....	.....	.....
Sparrows Pt. B3*.....	154	167	175	181	7.50	8.075	.....	.....	.....	.....	.....	.....
Struthers, O. Y1.....	158	167	173	175	7.40	7.80	.....	.....	.....	.....	.....	.....
Worcester A5.....	158	167	173	175	7.40	7.80	.....	.....	.....	.....	.....	.....
Williamsport, Pa. S3.....	158	167	173	175	7.40	7.80

F.o.b. Mill	Size		Seamless		Elec. Weld	
OD-In.	B.W. Ga.	I.D.	C.D.	H.R.	C.D.	

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RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	1 Sd. per Ton	Light Rail	Joint Bars	Track Spikes	Screws Spikes	Tin Plates	Track Bolts Treated
Bassett U/I	4.725	5.65	5.625				
St. Chicago R3				7.00			
Endicott T3	4.725	5.65					
Fairfield T3		5.65		7.00			
Gary U/I	4.725	5.65				5.625	
Ind. Harbor I3	4.725		5.625	7.00		5.625	
Johntown B3		5.65					
Joliet U/I		5.65	5.625				
Kansas City S3				7.00			
Lackawanna B3	4.725	5.65	5.625			5.625	
Minneapolis C3	4.725	6.15	5.625	7.00		5.625	12.40
Pittsburgh O1					11.00		12.40
Pittsburgh P3							12.40
Pittsburgh J3				7.00			
Seattle B3				8.00		5.775	12.40
St. Louis B3	4.725		5.625			5.625	
Scranton V1				7.00			
Terrance C7						5.775	
Williamsport S3		5.65					
Youngstown R3				7.00			

COKE

Furnace, beehive (f.o.b. oven)	Net-Ton
Connellsburg, Pa.	\$14.00 to \$14.50
Foundry, beehive (f.o.b. oven)	
Connellsburg, Pa.	\$16.00 to \$16.50
Foundry, oven coke	
Buffalo, del'd	\$28.08
Chicago, f.o.b.	35.75
Detroit, f.o.b.	26.25
New England, del'd	26.05
Seaboard, N. J., f.o.b.	25.50
Philadelphia, f.o.b.	25.00
Swedenland, Pa., f.o.b.	25.00
Plainsville, Ohio, f.o.b.	25.50
Erie, Pa., f.o.b.	25.00
Cleveland, del'd	27.48
Cincinnati, del'd	26.56
St. Paul, f.o.b.	23.75
St. Louis, f.o.b.	26.00
Birmingham, f.o.b.	24.40
Lone Star, Tex., f.o.b.	19.50

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE			CARBON*		
Diam. (In.)	Length (In.)	Price	Diam. (In.)	Length (In.)	Price
24	84	23.00	40	100, 110	9.00
20	72	22.25	35	110	9.00
18 to 18	72	22.50	30	110	10.05
14	72	23.00	24	72 to 84	10.30
12	72	23.50	20	90	10.10
10	60	24.25	17	72	10.35
7	60	24.50	14	72	10.55
6	60	27.25	12	60	11.75
4	60	30.25	10	60	11.80
3	60	32.00	8	60	12.10
2½	30	33.75	6	60	
2	24	52.50			

* Prices shown cover carbon nipples.

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb., f.o.b. shipping point)

Copper

Cast elliptical, 18 in. or longer,

5000 lb lots 58.92

Electrodeposited 58.25

Brass, 80-20, ball anodes, 2000 lb

or more 60.00

Zinc, ball anodes, 2000 lb. lots

(for elliptical add 2¢ per lb)

Nickel, 99 pct plus rolled carbon

(rolled depolarized add 3¢ per lb)

Cadmium 81.70

Tin, ball anodes and elliptical \$1.00 to \$1.10

Chemicals

(Cents per lb., f.o.b. shipping point)

Copper cyanide, 100 lb drum

100 lb bags, per cwt 83.50

Copper sulphate, 5 or more 100 lb

bags, per cwt 18.15

Nickel salts, single, 4-100 lb bags

Nickel chloride, freight allowed,

300 lbs 23.50

Sodium cyanide, domestic, f.o.b. N. Y.

1 to 4,500 lb drums 21.50

(Philadelphia add 5¢ per lb)

Zinc cyanide, 100 to 900 lb

Potassium cyanide, 100 lb drum

N. Y. 48.00

Chromic acid, flake type, 1 to 20

100 lb drums 31.20

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Machine and Carriage Bolt

Quantity	Discounts	
	Full case	20,000 lb.
1/2 in. & smaller x 6 in. & shorter	61	68
Larger than 1/2 in. diam. and all diam. longer than 6 in.	55	67
Rolled thread carriage bolts		
1/2 in. & smaller x 6 in. and shorter	61	68
Lag, all diam. x 6 in. & shorter	61	68
Lag, all diam. longer than 6 in.	55	67
Plow bolts	61	68

Nuts, Hex., H.P., reg. & hvy.

5/8" or smaller	64	66
5/8" to 1 1/8" inclusive	62	65
1 1/8" to 1 1/2" inclusive	65	67
1 1/2" and larger	61	68

C.P. Hex. regular & hvy.

5/8" or smaller	64	66
5/8" and larger	61	68

Hot Galv. Nuts (all types)

1 1/8" or smaller	44	47
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Finished, Semi-finished, Hex. Nuts

5/8" and smaller	66	68
5/8" and larger	65	68

Add 25% for less than case or keg quantity.

Rivets

	Base per 100 lb
5/16 in. and larger	39.95
7/16 in. and smaller	32

Cap Screws

	Discount	H.C. Heat
Bright Treated		
New std. hex head, packaged		
1/4" thru 1 1/2" diam. x 6" and shorter	84	80
9/16" and 5/8" x 6" and smaller and shorter	81	16
5/8", 1", 1 1/2" x 6" and shorter	8	+11
New std. hex head, bulk		
1/4" thru 1 1/2" diam. x 6" and shorter	49	41
9/16" and 5/8" diam. x 6" and shorter	48	39
5/8", 1", 1 1/2" x 6" and shorter	81	80

*Minimum quantity per item:

15,000 pieces 1/4", 5/16", 3/8" diam.

5,000 pieces 7/16", 1/2", 5/8", 3/4" diam.

2,000 pieces 1 1/2", 1", 5/8" diam.

Machine Screws & Stove Bolts

	Discount	Mach. Stove Screws Bolts
Packaged, package list ...	27	38

Bulk, bulk list

Quantity		
1/4-in. diam.	25,000-200,000	20
5/16-in. diam. & larger	15,000-100,000	20
All diam. over 3 in. long	5,000-100,000	—

Machine Screw & Stove Bolt Nuts

	Discount	Hex Square
Packaged, package list ...	24	37

Bulk, bulk list

Quantity		
1/4-in. diam. & smaller	25,000-200,000	12

CAST IRON WATER PIPE INDEX

Birmingham	109.2
New York	121.5
Chicago	122.9
San Francisco-L. A.	131.1
Nov. 1955 value, Class B or heavier 1 in. or larger bell and spigot pipe. Explanation: p. 57, Sept. 1 issue. Source: U. S. Pipe and Foundry Co.	

REFRACTORIES

Fire Clay Brick	Carloads per 1000
First quality, Ill., Ky., Md., Ohio, Pa. (except Salina, Pa., add \$5.00)	\$122.00
No. 1 Ohio	120.00
Sec. quality, Pa., Md., Ky., Mo., Ill. 114.00	
No. 2 Ohio	98.00
Ground fire clay, net ton, bulk (except Salina, Pa., add \$1.50)	18.00

Silica Brick	
Mt. Union, Pa., Ensley, Ala.	\$128.00
Childs, Hays, Pa.	135.00
Chicago District	138.00
Western Utah	144.00
California	151.00
Hays, Pa., Athens, Tex., Windham, Warren, O.	145.00
Curtner, Calif.	163.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	21.00
Silica cement, net ton, bulk, Hays, Pa.	24.00
Silica cement, net ton, bulk, Chicago District, Ensley, Ala.	22.00
Silica cement, net ton, bulk, Utah and Calif.	22.00

Chrome Brick	Per net ton
Standard chemically bonded, Balt.	\$91.00
Standards chemically bonded, Curtner, Calif.	101.25
Burned, Balt.	86.00

Magnesite Brick	St. % in. grains
Domestic, f.o.b. Baltimore	\$64.00
in bulk fines removed	
Domestic, f.o.b. Chewelah, Wash., Luning, Nev.	46.00
in bulk	
in sacks	46.00

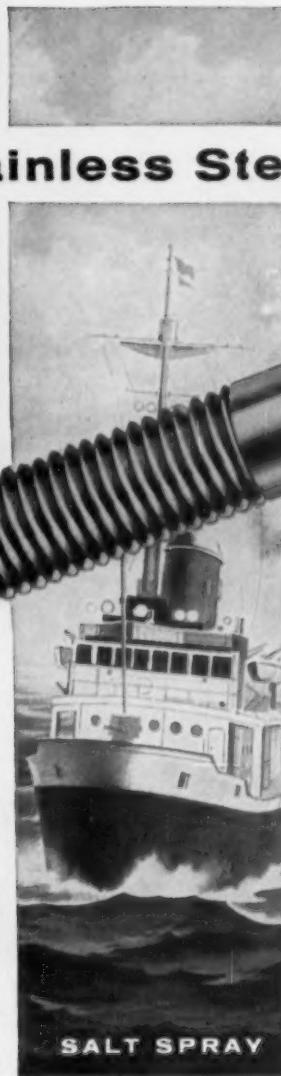
Dead Burned Dolomite	Per net ton
F.o.b. bulk, producing points in Pa., W. Va., Ohio	\$15.00
Midwest	15.80
Missouri Valley	14.00

METAL POWDERS	Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

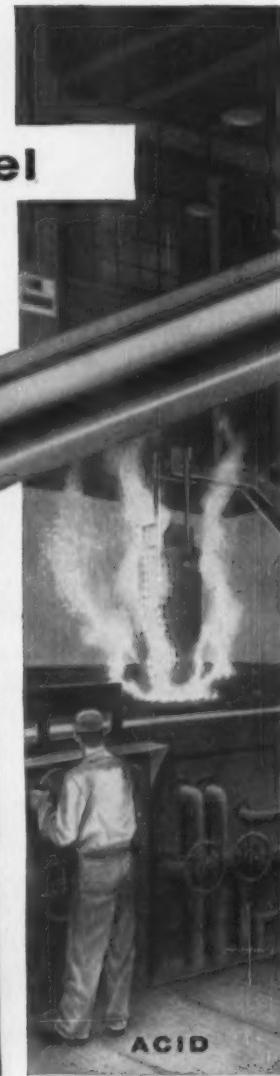
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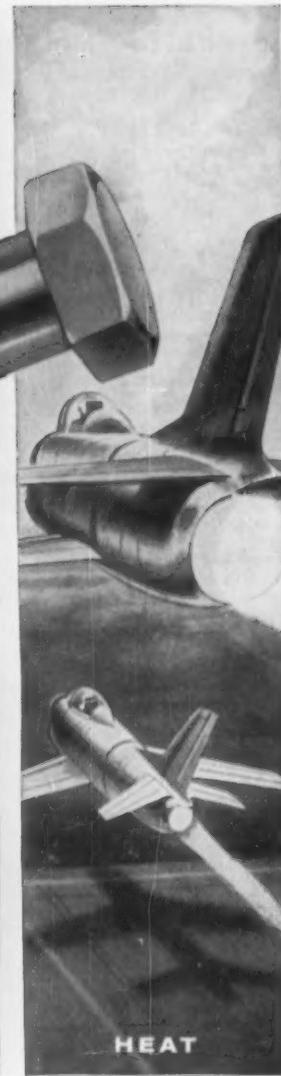
WEATHER



SALT SPRAY



ACID



HEAT

Stainless Steel

Fastenings that defy corrosion

- Stronger in tensile
- Higher in yield strength
- Higher in nickel content
- More corrosion resistant
- Engineered to highest standards
- Shipped in strong, neatly labeled packages

Specialists in all corrosion-resistant fastenings

Bolts • Nuts • Screws • Rivets • Washers
of Brass • Bronze • Monel • Aluminum • Stainless

Harper stainless steel bolts, screws, nuts, washers and rivets are the answer to many fastening problems where corrosion is a factor.

No additional cost for these Harper advantages of longer life and improved appearance for the equipment you manufacture. See your Harper Branch or Distributor or write for Catalog 26.

THE H. M. HARPER COMPANY
8215 Lehigh Avenue, Morton Grove, Ill.



Ferroalloy Prices

(Effective Dec. 18, 1955)

Ferrochrome

Contract prices, cents per lb contained Cr, lump, bulk, carloads, del'd, 67-71% Cr, 30-100% max. Si.	25.00
0.02% C	28.50
0.05% C	34.50
0.10% C	36.00
0.15% C	35.75
4.00-4.50% C, 67.70% Cr, 1-2% Si	26.25
8.50-9.00% C, 57-64% Cr, 3.00-4.00% Si	26.00

S. M. Ferrochrome

Contract prices, cents per pound, chromium contained, lump size, delivered.	
High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.	
Carloads	28.65
Ton lots	30.55
Less ton lots	32.05

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add \$1 per lb to regular low carbon ferrochrome price schedule. Add \$1 for each additional 0.25% of N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.	
0.10% max. C	\$1.27
0.50% max. C	1.27
9 to 11% C, 88-91% Cr, 0.75% Fe	1.36

Low Carbon Ferrochrome Silicon

(Cr 24-41%, Si 42-45%, C 0.05% max.) Contract price, carloads, delivered, lump, 2-in. x down, per lb of Cr, packed.	
Carloads	41.85
Ton lots	46.15
Less ton lots	48.65

Calcium-Silicon

Contract price per lb of alloy, lump, delivered, packed.	
20-35% Cr, 60-65% Si, 5.7% max. Fe.	
Carloads	22.95
Ton lots	25.25
Less ton lots	26.75

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered, packed.	
16-20% Ca, 14-18% Mn, 53-59% Si.	
Carloads	22.05
Ton lots	24.95
Less ton lots	25.95

SMZ

Contract prices, cents per pound of alloy, delivered, 60-65% Si, 5.7% Mn, 5.7% Zr, 20% Fe 1/2 in. x 12 mesh.	19.65
Ton lots	20.90
Less ton lots	

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.	
Carload packed	18.50
Ton lots to carload packed	19.65
Less ton lots	20.90

Graphides No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.	
Carload packed	18.50
Ton lots to carload packed	19.65
Less ton lots	20.90

Ferromanganese

Maximum contract base price, f.o.b. lump size, base content 74 to 76 pct. Mn.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	9.50
Clairton, Pa.	9.50
Sheridan, Pa.	10.75
Philo, Ohio	9.50
Add or subtract 0.1¢ for each 1 pct. Mn above or below base content.	
Briquets, delivered, 66 pct. Mn:	
Carloads, bulk	12.10
Ton lots packed	14.30

Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerston, Pa.	
Manganese Silicon	
16 to 19% 3% max.	\$86.00
19 to 21% 3% max.	88.00
21 to 23% 3% max.	90.50

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.	
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.	
Carload, packed	45.00
Ton lots	43.50

Electrolytic Manganese

f.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.	
Carloads	30.00
Ton lots	32.00
250 to 1999 lb	34.00
Premium for hydrogen-removed metal	0.75

Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50, Si 1.50% max. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn

31.85

Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.	
Carloads Ton Less	
0.07% max. C, 0.08% P	32.00
90% Mn	32.85
0.07% max. C	35.05
0.15% max. C	38.50
0.30% max. C	38.80
0.50% max. C	39.00
0.75% max. C, 80-85% Mn, 5.0-7.0% Si	28.45
25.80	26.50

Silicomanganese

Contract basis, lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.	
Carload bulk	11.20
Ton lots	12.65
Briquet contract basis carloads, bulk, delivered, per lb of briquet	12.70
Ton lots, packed	14.90

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., \$98.50 gross ton, freight allowed to normal trade area.	
Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., \$92.00	
Ton lots	

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.	
Ton lots Carloads	
56.50% Si, 2% Fe	22.75
58% Si, 1% Fe	23.25

Silicon Briquets

Contract price, cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si briquets.	
Carloads, bulk	6.75
Ton lots, packed	9.35

Electric Ferrosilicon

Contract price, cents per lb contained Si lump, bulk, carloads, delivered.	
50% Si	11.75
55% Si	14.50
90% Si	18.50

Ferrovanadium

50-55% V contract basis, delivered, per pound, contained V, carloads, packed.	
Openhearth	3.10
Crucible	3.20
High speed steel (Primus)	3.30

Alsifer, 20% Al, 40% Si, 40% Fe.

Contract basis, f.o.b. Suspension Bridge, N. Y., per lb.	
Carloads	10.65¢
Ton lots	11.80¢

Calcium molybdate, 43.5-46.5% f.o.b. Langlooth, Pa., per pound contained Mo	\$1.38
---	--------

Ferro-solumbium, 50-60%, 3 in. x D contract basis, delivered per pound contained Cb	\$1.36
Ton lots	\$6.90

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, contract basis, del'd, ton lots, 3-in. x D per lb cont'd Cb plus Ta	\$4.65
--	--------

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langlooth, Pa., per pound contained Mo	\$1.46
---	--------

Ferrotitanium, 40% regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgewater, Pa., freight allowed, ton lots, per lb contained Ti	\$1.35
---	--------

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload, per net ton	\$177.00
--	----------

Ferrotungsten, 16 x down packed, per pound contained W, ton lots, f.o.b.	\$3.45
--	--------

Molybde oxide, briquets, per lb contained Mo, f.o.b. Langlooth, Pa., bags, f.o.b. Washington, Pa., Langlooth, Pa.	\$1.27
Ton lots	\$1.24

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per lb	15.50¢
Carload, bulk lump	16.75¢
Ton lots, packed lump	16.

RITCO

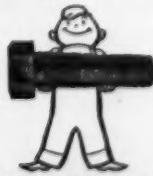
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December 15, 1955

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metal machining industry.



This \$5,000 worth of parts was salvaged
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**Working with plants throughout
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3. Some department heads won't admit the amount of scrap they actually have
4. Management didn't know how to solve the salvage problem

Today Elox equipped plants salvage 100% of scrap due to broken taps, drills, reamers, etc., profitably. Even on parts costing as little as 25c.

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Light and heavy machinery for all classes of sheet metal, plate and structural work

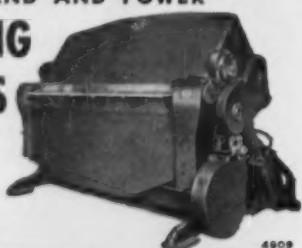
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Bending Steel Plate and Sheet
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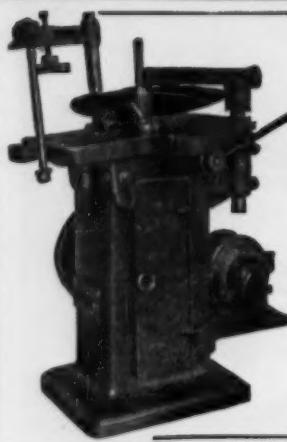
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spiral . . . $\frac{1}{8}$ " to 75"
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worm wheels . . . up to 98"
worms . . . any size
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THE CLEARING HOUSE

News of Used and Rebuilt Machinery

Chicago Sales Roll Along . . .

Traditionally, late October and November see the beginning of the seasonal slump in mid-western machine tool business. Buyers are out doing their own Christmas shopping. Not so in 1955. Inquiries from out-of-area buyers, particularly in medium and heavy press equipment, milling machines, boring mills, even welding equipment, have been either holding steady or gaining strength through November.

Aircraft and automotive accounts have taken a new lease on life, but demands from capital equipment producers are still gaining strength and often the buyer has a note of desperation that hasn't been heard since the Korean period.

One helpful factor in the strong demand, low supply picture has been the increasing number of auctions. Buyers want more equipment, and at the same time seem to be selling more used equipment out the back door as a fresh batch of used equipment, newly purchased, comes in the front. For the individual dealer, this may not be the relief it appears to be. Attendance at auctions has been gaining all year, bidding has been growing more competitive, and often by the time the auction is held the equipment owner has been visited by several potential customers hoping to buy up surplus equipment before it reaches the auction block.

What's Selling Best? . . . Sharpening in the heavy inquiry rate, particularly from the East, has been considerable interest in cranes, electrical equipment, and lately, heavier lathes. It's not hard to find an order from an out-of-town buyer. The trick is to fill the order once you have it.

Dealer inventories weren't strong when the heavy activity began to hit, back in May and June. Since then, there's been

virtually no letup in demand sufficient to let the dealer spot new material and rebuild his stocks.

Light sheet metal equipment, a bread-and-butter item in the mid-west and one that has held well since late 1954, is still a strong demand item. But where this was one of the few equipment lines that was showing consistent strength back in January, demand for other equipment lines is equaling pressure for this type of equipment or exceeding it.

Rebuilders Plenty Busy . . . The heavy demand for new machine tools along with the consequent lengthening of delivery times has put additional steam into a rebuilding backlog that was in good shape as early as June and July.

Rebuilding business looks as though it can't fail before the end of first quarter, if then. It shouldn't. Second quarter usually sees an advance in rebuilding activity.

The same now appears true for "as is" and "reconditioned" equipment. Sellers are beginning to admit that this cloud has too much silver lining to ground itself before late first quarter.

Prices Are Up . . . Despite some comment to the contrary, used tool prices appear to be advancing. With an even tighter market likely in first quarter '56, it seems probable that a dealer who doesn't advance some of his prices will suffer.

What About Next Year? . . . At this point, the wind up weeks of this year appear to be among the strongest used tool selling periods since the post-Korea slowdown began.

This is true not only of the Mid-West generally, but also applies to the East and Far West as well. The upward spurt which gained nationwide momentum in the third quarter will continue.

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8" x 2" x 5" Buffalo No. 1
14" x 1½" x 8" Niagara No. 3
#1231 60' Length, Charging Box 66x18x34. Pressure Bale 125 to 150 lbs.
#125-TC Galland Hanning. Volume of Box 144 cu. ft. Bale Size 500 to 800 lbs.

BENDING ROLLS

12" x 8" Bartech Initial Type
19" x 12" Bartech Initial Type
12" x 8" Niles Pyramid Type
18" x 12" Bartech Initial Type Bending Roll
18" x 8" Wicket Pyramid Type

BRACKETS—LEAF TYPE

12" x 2" Dresl & Krumpp
12" x 1½" Dresl & Krumpp, Motor Driven

BRACKETS—PRESS TYPE

12" x 8" Motor Press Brake, 250 ton Capacity
12" x 5/16" Picture Hydraulic, 380 ton

BROACH

Model VP-4-10-10 American Vertical Hydr. Broach. Max Capacity 60 ton. Stroke 40". Motor Drive.

CRANES—OVERHEAD ELECTRIC TRAVELING

5 ton P&H	25' Span 220 Volt D.C.
5 ton Northern	50' Span 220 Volt D.C.
5 ton Cleveland	Span 200 Volt D.C.
7½ ton P&H	45' Span 440/3/60 A.C.
10 ton Niles	55' Span 330 Volt D.C.
10 ton Milwaukee	50' Span 220 Volt D.C. With 5 ton Auxiliary
10 ton P&H	55' Span 220 Volt D.C.
15 ton P&H	50' Span 220 Volt D.C.
20 ton P&H	45' Span 220 Volt D.C.
20 ton Toledo	75' Span 550/3/60 A.C.
30 ton Shaw	60' Span 220 Volt D.C.
130 ton Whiting	85' Span 220/3/60 A.C. With 15 ton Auxiliary

• Manufacturing

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SELECT MACHINE TOOLS

GRINDING MACHINES

72" Hatchett 3-spnd. rotary surface, new 1946.
16" x 60" Landis gap type cylindrical, new 1941.
15" x 60" Model 300 Hatchett vert. spnd., late.

HAMMERS

No. 6-1 Naze, pneumatic, late.
No. 50 Naze, self-contained.
No. 6B Naze, self-contained.

LATHES

15" x 38" x 60" x Nobel gap lathe, 1941.
20" x 67" Axelson H.D. engine lathe, late.
24" x 8" LeBlond H.D. engine lathe.
14" x 6" Hendey Treadmill, 1946.
15" x 30" Lipe Carbo-Matic, 1942.

MILLS

M-24 Kearney & Trecker Mig. Mill
1-18 Cincinnati production.
2-16 Cincinnati production, late model.
Model 2-20 Kent-Owens hyd. mill, late (2).
60" x 48" x 10" Ingersoll adj., rail planer type.
No. 15 H. & T plain horiz., new 1942.

PLANERS

30" Rockford Hyd. Open-side Shaper-Planer.
48" x 48" x 10" Gray Maxi-Service.

PRESSES

90 ton No. 92½-C Toledo D.C. Str. Sids.
280 ton No. 796½-72 Toledo D.C. Toggle drawing.
500 ton No. 1009 Hamilton D.C. adj. bed. 60" x 102".
545 ton No. H361½C Hamilton Forging Press.

SHAPERS

24" Gould & Eberhardt Universal.
32" G & E Invincible, P.M.D., late type.

SCHEARS

50" x 18" Bartech power squaring shear, 10" gap.
50" x 18" G.A. Bliss power squaring shear.

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2½" Ajax suspended slides, steel frames.
Ajax suspended slides, steel frames, air clutch.
1½" National Upsetter, guided ram, hard ways.
2" National Upsetter, guided ram, air clutch.

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1" to 5" Amco, Ajax, National

1", 4", 5", National High Duty, Air Clutch

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Low Wilson Natural Gas Annealing Furnace, Work Dimensions 48" oval, 86" Piling Height

Ther-Matic Induction Heater Model 144

2 ton Swindell Dressler, Top Charge

6 ton Hercourt Top Charge

15 ton Hercourt Top Charge, with Transformer

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STEAM FORGING—800 lbs. to 22,000 lbs.

12" x 10" Chambersburg Steam Forging

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52" McKay 17 Rolls 3½" Dia.

72" McKay 15 Rolls 4½" Dia.

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200 ton United Steam Hydr. Forging Press

520 ton Baldwin Southwick, 12" Stroke 48" x 25" Between Columns

890 ton Clearing, 48" Stroke, Bed Area 54" x 48"

1300 ton Landis Double Acting, 48" Stroke, Bed Area 72" x 145"

1257 ton Baldwin Southwick Forging Press, 80"

Stroke Main Ram, 54" x 41" Bed, Columns

3045 ton Birdsboro, 4 Columns, 14" Stroke Plates

42" x 48" Darlites 47"

4500 ton B-L-H Hydr. Forging Press

PRESSES—Straight Side

Clearing Model CF-100-200 Triple Acting, Strokes

14" to 18" Bed Area 100" x 300"

PUNCH & SHEAR COMBINATIONS

BLUMFO 22' Pels Universal Ironworker, Capacity

Punch 1½" thru 3" Shear Angles 62½"

KING 22' Buffalo Universal Ironworker

Style EF Cleveland 32" Throat, Punch 1½" thru 1"

Style W Cleveland Single End, 30" Throat, 313 Ton

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12" x 34" Garrison Single Stand Two High

16" x 34" Farrel F&M Two Stand Two High

18" x 34" United Single Stand Two High

20" x 36" Hoagland Single Stand Two High

22" x 40" Lewis Three High

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8 Stand Baffler Tube Forming Machine, Spindles 1½"

SHEAR—GATE

80" x ¾" Pels

SHEAR—ANGLE

8" x 6" x ½" Hillies & Jones

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34" H&J Guillotine, Capacity 3½" Square, 4" Round

SHEARS—ROTARY

½" King #250 With Flanging Attachment

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24" Farren Colt & Sheet Blitter

38" Custom Built Blitting Line, With Collets & Leveler

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5,000, 10,000, 18,000, 20,000, 25,000 lb. Olsen & Riehle Uni-

versal; 50,000 & 300,000 lb. Compression

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D. C. MOTORS

Qu.	H.P.	Make	Type	Volts	RPM
1	3000	Whas.	Tandem	550	600
1	2200	G.E.	MCF	600	400/500
3	1500	Whas.	Br.	600	600
1	1400	G.E.	MCP	600	63/190
1	1200	G.E.	MCF	600	750/850
1	1000	G.E.	MCF	600	600/500
3	910	Whas.	Q.M.	250	140/170
1	800	Whas.	Q.M.	250	450/550
1	600	Al. Ch.	Q.M.	250	400/800
1	500	Whas.	CC-218	600	300/900
3	450	Whas.		550	415
1	350	Whas.		250	200/300
1	200	G.E.	MPC	250	400/500
1	200	G.E.	CD-1450E	250	500/1500
1	200	Whas.	CH-5113	250	400/700
1	150	G.E.		600	350/750
1	150	Cv. Wh.	65H	230	1150
1	150	Cv. Wh.	51H-TEFC	230	900
1	150	Whas.	3121B	230	900/1000
1	150	Whas.	RK-201	250	350/1500
1	120	G.E.	MCF	230	250/1800
1	125	Whas.	RK-161	250	500/1500
1	125	Whas.	RK-183	250	850
1	100	Hcl.	1050T	230	400/1200
2	100	Whas.	RK-181	230	400/1000

M-C Sets—3 Ph. 60 Cy.

Qu.	K.W.	Make	Type	D.C.	A.C.	Volts
1	2000/3400	G.E.	450	234/380	2300	4600
1	1750/2100	G.E.	514	250/380	2300	4600
1	2000	G.E.	250	568	1100	
1	3000	G.E.	514	600	8800/13200	
1	1500	G.E.	729	600	6800/12300	
1	1800	G.E.	729	600	2300/4600	
2	750	G.E.	729	275	2300/4600	
1	750	Whas.	868	350	3300/4900	
2	800	G.E.	729	250	440/2200	
1	300	Whas.	1200	250	200/440/550	

TRANSFORMERS

Qu. KVA	Make	Type	Ph.	Voltages	
1	3000	Wagner	HPW-20	3	24000/2400
3	1000	O.H.	HYTDJ	1	24000/1200
6	1000	Wagner	OIRC	1	12200/640
3	667	G.E.	HD	1	12800/2300
3	650	Ruhl	HRC	1	2300/2300/4600
3	500	G.E.	HT	1	2300/4600
2	333	G.E.	HWWR	1	2300/4600/2300/4600
2	250	Penn.	DIRC	1	24500/1200/2400

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I—Bar and Rod Mill—Cross Country, 2 stands 18" x 60" 3-Hi Rougher, 3 stands 12" x 32" 3-Hi Intermediate, 6 stands 10" x 24" 3-Hi Finishing and 1 stand 10" x 24" 2-Hi Finishing. Complete with Shears, Guides, etc., and all Electric Drives.

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Qu.	KW	Make	R.P.M.	
			D.C. Volts	
1	2500	West.	720	600
1	2500	Cr. Wh.	720	600
1	500	Cr. Wh.	720	600
1	500	West.	1360	125/250
1	400	Cr. Wh.	1200	125/250
1	300	G.E.	1360	250
1	300	G.E.	1200	250
1	150	G.E.	1200	250
1	100	West.	800	250

LARGE MILL MOTORS			
Qu.	H.P.	Make	R.P.M.
			Volts
1	3000	West.	600
1	3000	West.	525
1	2500	G.E.	360/720
1	2500	West.	525
1	1500	West.	360/720
1	1000	West.	360/720
1	500	West.	360/720
1	300	Al. Ch.	360/1000
1	250	Al. Ch.	360/1000

SLIP RING MOTORS Constant Duty, 3 Phase, 60 Cycle

Qu.	H.P.	Make	Type	Volts	R.P.M.
1	1500	G.E.	MT-408	2300	360
1	1000	G.E.	MT-408	2300	1185
1	750	G.E.	T-M	2300	460
1	500	Al. Ch.	ANY	2200	505
1	500	G.E.	I-M	2300	450
1	450	G.E.	I-14-M	2300	805
1	450	West.	CW	2200	440
1	400	Al. Ch.	MT-408	2300	360
1	300	West.	CW-1012	2200	704
1	250	Al. Ch.	ANY	440	705
1	250	West.	CW-1108	2200	435
1	250	G.E.	MT-414	2300	360
1	200	Al. Ch.	ANY	2300	185
1	200	G.E.	I-14-M	2300	805
1	150	Al. Ch.	ANY	440/220	705
1	150	West.	CW	440/220	496
1	150	West.	CW-1000	440/220	435
1	100	West.	EDY-612	2200	906
1	100	G.E.	MT-508	440/220	706
1	100	G.E.	I-15-A	2300	495
1	100	Al. Ch.	ANY	440/220	530

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I—20"/24" Wide Continuous Strip and Plate Mill. Motor Driven throughout, including all Electrical Equipment and Furnaces. For rolling slabs 20"/24" x 3" x 10' down to plate or strip from 1" to .065" finished gauge. Annual capacity 150,000 tons.

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I—144" x 3/16" Stamco Power Squaring Shear, Spring Activated Holdown and Spring Top Knife Balance. Rebuilt and Guaranteed.

I—2000 HP Mesta Gear Reducers, Ratios 10 to 1 and 7.375 to 1.

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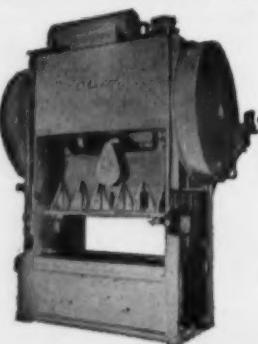
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I—65 ton Diesel Elec. Locomotive

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I—25 ton Diesel Locomotive Crane

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2-20 and 25 ton Truck Cranes

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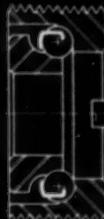
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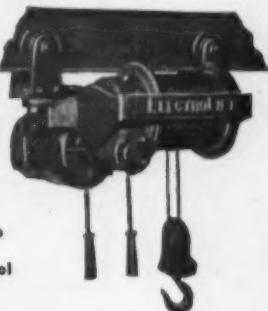
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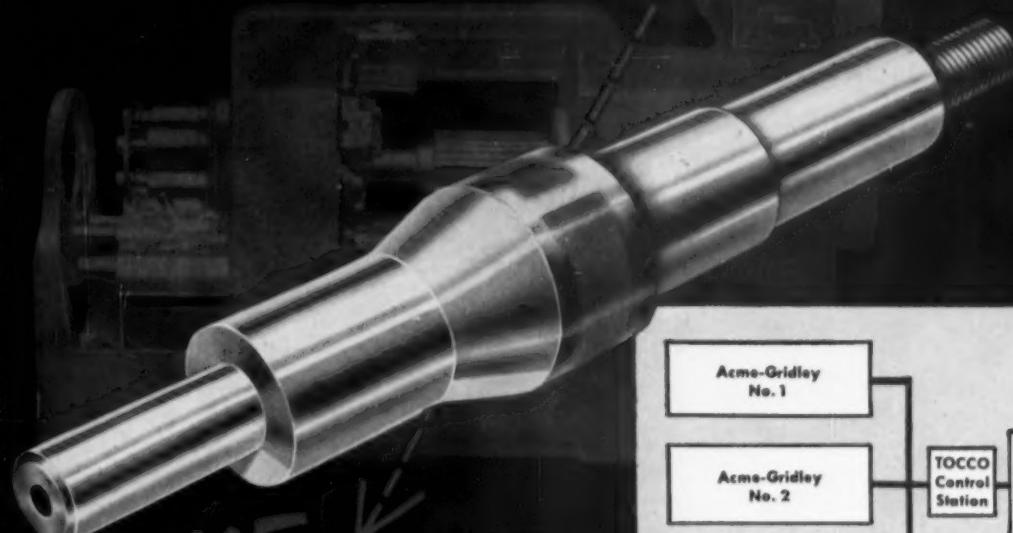
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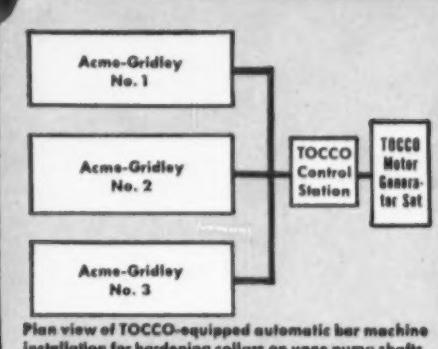
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